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CORROSION PRODUCT TRANSPORT STUDIES AT BRUCE-B NGS

Report No 90-72-K

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ABSTRACT

Corrosion product transport surveys were conducted at Bruce 7 during shutdown and startup in April and June/1988 respectively.

Elevated concentrations were observed in all sampling locations, except at the blowdown lines during startup. Corrosion product ingress to the steam generators increased during shutdown and startup. However, only the June/1988 startup increased the sludge buildup significantly (total ingress over 16.8 kg). Relatively small amounts of sludge were removed by continuous blowdown except during shutdown. During intermittent blowdown inflated sludge removal was observed.

The condensate system appeared to be the main source and the preheater an important location for sludge deposition. During the June 17 startup, the deaerator released a substantial amount of corrosion products. This implied that significant corrosion might have occurred in the deaerator during the extended maintenance period.

job	file	date	report no.
36-506-053	836.3332	June 6, 1990	90-72-K

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EXECUTIVE SUMMARY

CORROSION PRODUCT TRANSPORT STUDIES AT BRUCE-B NGS

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Bruce B management requested Chemical Research Dept to conduct a corrosion product transport survey at Bruce 7 during shutdown and startup in April and June/1988 respectively. The objectives of the surveys were to estimate corrosion product ingress to steam generators and to identify major corrosion product sources.

Bruce 7 has an all ferrous feedtrain and uses all volatile treatment ammonia water chemistry. Feedwater pH is maintained at about 9.6. Integrated sampling was used in the following sampling lines in these studies:-

(a) condensate extraction pump discharge (CEP)
(b) boiler feed pump discharge (BFP)
(c) HP heater #5A outlet (HP Htr 5A)
(d) pre-heater outlet I (to steam generators 1-4)
(e) steam generator inlet I (to steam generators 1-4)
(f) steam generator blowdown 1-4
(g) reheater drains
(h) moisture separator drains (MSD)

During sampling, the suspended solids (filterables) and the non-filterables were both collected. Samples were generally taken at about 12 hour intervals, although more frequently during startup. The weight of the suspended solids and the elements: Fe, Ni, Ti, Mn, and Cr, in these samples were obtained from analysis.

Shutdown April/1988

Sampling started on April 13, 1988 at about 3 pm. On April 14, the reactor was tripped but restarted later. On April 15, at about 7:30 pm, the unit was taken off the power grid. A series of turbine tests was performed before shutting down the reactor.

job	file	date	report no.
36-506-053	836.3332	June 6, 1990	90-72-K

(a) Corrosion Product Concentrations

During shutdown, concentration spikes occurred in practically all sampling locations. The highest concentration in the feedtrain was approximately 70 ppb (occurred at the BFP) but the peak concentrations in the drain systems and blowdown were orders of magnitude higher.

The concentration profile of iron and manganese showed a large peak at the CEP during the April 14 startup. Analysis showed that during that period, non-filterable iron (95.2%) and manganese (98.6%) far exceeded the filterables. Otherwise, the elements were mainly transported in filterable form.

(b) Corrosion Product Transport

The condensate system appeared to be the main source. Significant deposition occurred in the deaerator (and possibly in the LP heaters) and the preheaters. Deposition in the HP heaters was also apparent. Iron was the main element in transport.

From April 13-15, approximately 5.3 kg of particulates were released from the condensate system. About 1.6 kg were found to be deposited in the deaerator; 0.5 kg in the HP heaters; 2.5 kg in the preheaters and about 0.7 kg went into the steam generators.

Continuous blowdown was not effective in removing sludge from the steam generators except during reactor shutdown. Sludge removal appeared to be inflated during intermittent blowdown.

Startup June/1988

Unit 7 was shutdown and under maintenance from April 16 to early June, 1988. On June 17, unit 7 was synchronized at 5:25 am. and power was increased in 2 steps to almost full power. On June 19, the reactor experienced flux tilt problems and was shutdown. An attempt was made to restart the reactor on June 20 but abandoned later. On June 21, unit 7 was restarted and power was then raised in steps to almost full power. Sampling continued until June 24, 1988.

(a) Corrosion Product Concentrations

All sampling locations (except boiler blowdown) showed 2 peaks in their concentration profiles reflecting the 2 power increases. The highest particulate concentration occurred at the reheater drains (almost 8 times higher than that observed in the

feedwater). When power finally levelled off, particulate concentrations in the feedtrain dropped rapidly to approximately 30 ppb and below. During the shutdown on June 19, particulate concentrations increased rapidly.

When power was increased on June 21, the pattern of concentration spikes and dropping to the baseline was again observed.

Particulate concentrations in steam generator blowdown remained relatively flat (generally less than 500 ppb) even during power ramp periods. The concentrations only increased rapidly during the shutdown on June 19 and during an intermittent blowdown on June 23.

The elements (other than manganese) were transported mainly in filterable form in all sampling locations, except nickel at HP heaters on June 21. For manganese, the non-filterable form was important at the preheaters and blowdown, particularly during the startup on June 21.

(b) Corrosion Product Transport

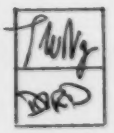
The condensate system was the main source of sludge; however, during the June 17 startup, a substantial amount also came from the deaerator. This implied that significant corrosion might have occurred in the system during the extended maintenance period from April to June.

During the June 17 startup, at least 16.8 kg of suspended solids were transported into the steam generators. However, transport during the June 21 startup was much less. Only relatively small amounts were removed by continous blowdown in both instances.

The apparent increase in sludge removal by the intermittent blowdown on June 23 could be an artifact. Further investigation (to be conducted by Bruce B), such as monitoring the concentration of corrosion products during the whole course of intermittent blowdown, is suggested.

CONCLUSION

These surveys appear to reveal the general transport behaviours during startup and shutdown. They help identify sources of sludge and locations of sludge deposition and release, and provide estimates of sludge accumulation.



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To Dr. D. Mills
Director of Research

Corrosion Product Transport Studies at Bruce-B NGS

T.W. Ng

1.0 INTRODUCTION

Corrosion products are carried by feedwater into the steam generators and eventually deposit on heat transfer surfaces. These deposits act as concentrating cells and promote under-deposit corrosion. In time, material degradation will reduce steam generator reliability. Corrosion product transport surveys are usually used to estimate feedwater corrosion product ingress to steam generators and to identify major sources. They may also be used to help define optimum system chemistry to minimize corrosion. Bruce B management requested Chemical Research Department, Research Division to conduct such a study. This report describes the activities at Bruce 7 during shutdown and startup in April/1988 and June/1988 respectively.

2.0 DESCRIPTION OF STUDY FEEDTRAIN AND SAMPLING LOCATIONS

Bruce 7 has an all ferrous feedtrain. A schematic diagram of the secondary system is shown in Figure 2.1. The materials of construction of the major components are summarized in Table 2.1. Bruce 7 uses all volatile treatment water chemistry. Ammonia is added to maintain the feedwater pH at about 9.6. Hydrazine is added to the deaerator storage tank, which helps to maintain the dissolved oxygen levels low. Makeup water and condenser cooling water are drawn from Lake Huron.

2.1 Sampling Equipment

The sampling equipment and procedures have been described in Research Division Report C88-36-K. A computerized flow monitoring system for the particulate sampling streams was added to the original setup. The system recorded and displayed the flowrates.

Integrated sampling was used in the following sampling points in Unit 7 in these studies:

(a) condensate extraction pump discharge (CEP), #8 in Fig. 2.1
(b) boiler feed pump discharge (BFP), #11
(c) HP heater #5A outlet (HP Htr 5A), #13
(d) pre-heater outlet I (to steam generators 1-4), #15
(e) steam generator inlet I (to steam generators 1-4), #16
(f) steam generator blowdown 1-4, #20
(g) reheater drains, #17
(h) moisture separator drains (MSD), #22

2.2 Flow Streams and Sampling Points

Condensate is made up of water coming from the condense and the shell side of the LP heaters, ie, the condensate system. The water goes through the condensate extraction pump (sampling point #a) to the tube side of the LP heaters and the deaerator. The boiler feed pumps (sampling point #b) pressurize the water through the tubes of the HP heaters (sampling point #c) and the shell side of the preheater (sampling point #d). The feedwater then combines with the water from the reheater drains (sampling point #g) and flows into the steam generators (sampling point #e). Hot water from moisture separator drains (sampling point #h) flows to the shell side of the HP heaters during normal operations or to the deaerator during low power operations.

3.0 SAMPLING CAMPAIGNS

Two sampling campaigns were performed:

3.1 Shutdown April/1988

The sampling equipment was tested on April 7 - 8, 1988. Unit 7 was scheduled to shutdown on April 15. Sampling started on April 13, at about 3 pm. Prior to sample collection, unit 7 was load following; the reactor was running at about 30% full power. After a few hours, power was increased to about 75%. On April 14, the reactor was tripped at about 9:30 am but restarted at about 11:30 am. On April 15, at about 7:30 pm, the unit was taken off the power grid and a series of turbine tests was performed. After the tests the reactor was shutdown. In general, samples were taken at approximately 12 hour intervals. It is interesting to note that after shutdown on April 15, sampling was still available for sometime because the pressure in the system was not released immediately. However, these data were not used for transport estimates since there was practically no flow in the system. Sampling results are summarized in Appendix A.

3.2 Startup June/1988

Unit 7 was shutdown and under maintenance from April 16 to early June. On June 13, the unit was in hot standby, but power was not raised due to some mechanical problems. Some samples were taken during the standby period. On June 17, unit 7 was synchronized at 5:25 am. and power was increased. Collection of samples started at 9:40 am. To study the concentration changes during power increase, the CEP, BFP and HP heater sampling lines were monitored hourly while the other lines were sampled for about 5 hours. After the initial sampling period, samples were collected approximately every 12 hours.

On June 19, at about 2 pm, the reactor experienced flux tilt problems. At about 7 pm the reactor was shutdown. An attempt was made to restart the reactor on June 20 but abandoned later. On June 21, unit 7 was restarted at about 1 am and synchronized shortly afterwards. Power was then raised in steps to almost full power. Samples were collected until June 24, 1988. Sampling results are included in Appendix B.

3.3 Sample Analysis

Samples from these 2 sampling campaigns were sent to Chemical Research Department, Research Division. The membrane filters were dried and the weight of suspended solids was obtained (matched pair filters were used). Deposits on the membrane and on the ion-exchange papers were acid digested in separate beakers. Each solution was made up to 50 mL and analysed for iron, nickel, titanium, manganese, and chromium using inductively coupled plasma atomic emission spectroscopy. The detection limit (in mg/L) of these elements in the solutions are as follows:

iron	-	0.02
nickel	-	0.01
titanium	-	0.05
manganese	-	0.01
chromium	-	0.02

The weight of the elements on the membrane filters and on the IX resin filters were obtained from analysis results. The element concentration was calculated from the volume of water passing through these filters. The element total concentration is the sum of the concentrations in the filterables (on membrane filters) and the non-filterables (on IX resin filters).

The percent filterable of each element is obtained by dividing the element concentration in the filterables by the element's total concentration.

4.0 RESULTS AND DISCUSSION

4.1 Shutdown April/1988

This sampling campaign included 2 shutdowns. The first one was unscheduled due to a reactor power trip on April 14.

(a) Corrosion Product Concentrations

Particulate Concentrations

Particulate concentration profiles at 5 sampling points in the feedtrain are summarized in Fig. 4.1.1. The concentration profiles of the elements (see Figures 4.1.2 to 4.1.6) are also grouped together for comparison, their results will be discussed in the next section. Concentration spikes occurred at several locations when power level dropped, eg, on April 14 and April 15. However, the startup on April 14 did not cause any significant increase in particulate concentration in most of the sampling locations. In the feedtrain, the highest concentration was recorded at the BFP (70 ppb approximately) on April 15.

During shutdown elevated particulate concentrations were also observed in the drain systems (see Figure 4.1.7, and Figures 4.1.8 to 4.1.12) and boiler blowdown (see Figure 4.1.13, and Figures 4.1.14 to 4.1.18). Their concentration levels could be orders of magnitude higher than those in the feedtrain. In addition, the samples collected from the drains sometimes contained black crystals of magnetite.

It is interesting to note that the spike at boiler blowdown during the power trip on April 14 is higher than that during the shutdown on April 15 (see Figures 4.1.13, and 4.1.14 to 4.1.18). The increase is suspected to be an artifact caused by an intermittent blowdown applied to the boilers prior to the power trip. During intermittent blowdown, the fast flow may have sloughed off a substantial amount of corrosion products from the inside wall of the blowdown pipe, resulting in a concentration increase. A simple test to this hypothesis might be to check the particulate concentration after the completion of intermittent blowdown. If the sludge in the boilers was stirred up, high particulate concentration would persist in continuous blowdown.

Element Concentrations

Concentration profiles of the elements at 5 sampling points in the feedtrain are shown in Figures 4.1.2 to 4.1.6. Only nickel appears to follow a trend relatively similar to that of the particulates; the other elements behave differently. Iron and manganese showed an unexpectedly large peak at the CEP during the

April 14 startup. The concentration of iron was much higher than that of the particulates. This may first appear contradictory. Usually, iron is transported in filterable form. It happened that during that period, the non-filterable iron (95.2%) far exceeded the filterables (see Table A-5, sample B88-04-R4-FC1). Manganese also behaved in a similar manner. It is suspected that a lot of fine particles were stirred up during the April 14 startup. These fines passed through the 0.45 um filters and were picked up by the ion-exchange resin papers. However, this hypothesis needs to be confirmed since large proportions of non-filterables were detected at the CEP only.

The molar ratio of the elements (with respect to iron) in the filterables and the non-filterables did not show any specific trend (see Table A-6). The ratios in the non-filterables were generally higher than the corresponding ones in the filterables (note: non-filterables include soluble and colloidal species). It should be mentioned that in some boiler blowdown samples, there was more manganese than iron.

(b) Corrosion Product Transport

Particulate Transport

Cumulative particulate transport at 5 sampling points in the feedtrain is shown in Fig.4.1.19. The condensate system appears to be the main corrosion product source (see also Table 4.1). Significant deposition occurred in the deaerator (and possibly in the LP heaters) and the preheaters. Deposition in the HP heaters was also apparent.

From April 13 to 15, approximately 5.3 kg of particulates were released from the condensate system. About 1.6 kg were deposited in the deaerator; 0.5 kg in the HP heaters; 2.5 kg in the preheaters and about 0.7 kg went into the steam generators. The ingress appeared to agree with the cumulative particulate transport (about 0.8 kg) at the steam generator inlet (see Table A-8 sample B88-04-R6-FC5). Although corrosion product transport increased during reactor shutdown, the total ingress from April 13 - 15 was equivalent to the input by the feedwater in 2.6 days of steady load full power operation, assuming a particulate concentration of 3 ppb at the steam generator inlet and a flowrate of 1200 kg/s. Thus the shutdown in April did not increase sludge buildup in the steam generators significantly.

Cumulative transport in the reheater drains had to be estimated because the flows were not measured. Using an average flowrate of 30 kg/s, the cumulative transport was relatively small until the shutdown on April 15 (only 8.4 g before shutdown but 410 g including shutdown, see Table A-8 reheater drains samples).

However, judging from the difference in particulate transport between the steam generator inlet and the preheater (see Figure 4.1.19) the reheater drains appeared to contribute constantly about 1/3 to 1/2 of the sludge transported to the steam generators. The reason for the discrepancy is not apparent.

No blowdown flow was recorded during this sampling campaign. Removal of particulates from the steam generators by continuous blowdown was estimated by assuming a flowrate of 3 kg/s. Continuous blowdown was not effective in sludge removal except during the shutdowns on April 14 (1.2 kg of sludge removed; note: intermittent blowdown applied prior to shutdown) and April 15 (0.6 kg removed; see Table A-8 Blowoff samples). As mentioned earlier, the intermittent blowdown might have inflated the total sludge removal.

Element Transport

Cumulative transport of the elements in the feedtrain is shown in Figures 4.1.20 to 4.1.24. Iron was the main element in transport. The non-filterables played an important role in the transport of iron and manganese at the CEP. During the April 14 startup, only 4.79% (Fe) and 1.37% (Mn) in transport at the CEP were filterable (see Table A-5 sample B88-04-R4-FC1). As a result, approximately 8 kg of total iron and 280 gm of total manganese were transported by the condensate. Nickel and chromium transport were relatively small and titanium was almost negligible compared to iron. At present, the origin of titanium in the secondary system is not clear; although the paint of the turbine casing is a prime suspect. The transport behaviours of the elements in the feedtrain are summarized in Table 4.1.

Cumulative transport of the analyzed elements in the feedtrain, reheater drains, and blowdown are summarized in Table A-8. Corrosion product transport in the reheater drains and moisture separator drains were generally low except during shutdowns. Sludge removal by blowdown was probably inflated by the intermittent blowdown on April 14 (see Tables A-7 and A-8 sample B88-04-R3-FC4).

4.2 Startup June/1988

This sampling campaign actually covered 2 startups due to a power trip on June 19.

(a) Corrosion Product Concentrations

Particulate Concentrations in Feedtrain

On June 17, power was raised in 2 steps. Particulate concentration profiles at most of the sampling points reflected the 2 power increases with a display of 2 separate peaks (see Figure 4.2.1). The highest concentration was observed at the HP heaters during the first power increase but at the BFP during the second. When power finally levelled off, particulate concentrations in the feedtrain dropped to approximately 30 ppb and below. As a result of flux tilt problems, the reactor was shutdown on June 19. This caused the particulate concentrations to increase rapidly. The highest concentration was observed at the CEP.

From June 19 to 21, attempts to restart the reactor were made as evident by the concentration spikes observed (denoted by the dotted lines in Figures 4.2.1 to 4.2.13). However, no flow data were recorded during that period. When power was increased on June 21, concentration spikes were again observed at the CEP, BFP and HP heaters, with the highest concentration registered at the CEP and HP heaters. These concentrations dropped rapidly as power gradually levelled off.

Particulate Concentrations in Reheater Drain and Blowdown

The particulate concentration profile for the reheater drains (see Figure 4.2.7) appears to show 2 peaks during the June 17 startup (one full peak and a portion of another peak). The peak concentration was much higher than those observed in the feedtrain (almost 8 times higher). Particulate concentrations dropped rapidly as power levelled off. When the reactor was shutdown on June 19, the particulate concentration in the reheater drains increased rapidly. It should be pointed out that samples from the drain system often contained black shiny crystals of magnetite (see Table B-1).

An elevated concentration was observed at the reheater drains during the startup on June 21. The peak concentration was much lower than that registered on June 17. Particulate concentrations dropped gradually as power levelled off.

The particulate concentration data for moisture separator drains are incomplete (see Table B-7). The concentration profile for the moisture separator drains appeared to show a trend similar to that for the reheater drains.

Compared with the concentration profiles for the feedtrain and drain systems, a different pattern emerged at the boiler blowdown

(see Figure 4.2.13). Particulate concentrations remained relatively flat during power ramp periods and were generally less than 500 ppb (although in a sampling run which covered an intermittent blowdown on June 17, the concentration reached slightly over 750 ppb). The concentrations increased rapidly during the shutdown on June 19.

A concentration spike at the blowdown lines appeared on June 23 and coincided with an intermittent blowdown applied to the steam generators (see Table B-9). No significant elevated concentration was observed afterwards. Therefore, the increase does not appear to originate from the steam generators (see discussion in Section 4.1 Element Concentrations). Further investigation (to be conducted by Bruce B), such as monitoring the concentration of corrosion products during intermittent blowdown, is recommended.

Element Concentrations in Steam/Water Cycle

Concentration profiles of the elements in the feedtrain and the reheater drains are fairly similar to those of the particulates (see Figures 4.2.2 to 4.2.6 and 4.2.8 to 4.2.12). There are some minor differences. For example, although the concentration of titanium increased during startup and shutdown at most sampling locations in the feedtrain, the trends were less well defined; and iron showed only one concentration peak at the reheater drains.

Concentration data of the elements at the blowdown lines are summarized in Table B-7. There are some discrepancies between the transport trends of the elements and that of the particulates, probably due to errors in chemical analysis of some of the samples. The errors were suspected to arise when a portion of the submitted sample(s) was weighed and analyzed, (but the weight was not recorded) and the results were reported as if the whole samples were used. For example, the weight of the samples B88-06-R12-FC4 and B88-06-R19-FC4 (see Table B-2) were approximately 0.8 and 3.4 g respectively, but the amounts of analyzed iron were only 0.006 and 0.03 g (see Table B-3). These results are clearly in error. It is quite likely that there may be errors in other samples as well, eg, B88-06-R9-FC4.

Iron and nickel were transported mainly in filterable form in all sampling locations, except nickel at the HP heaters during the startup on June 21 (see Table B-5). For manganese, the non-filterable form was rather important at the preheaters and blowdown, particularly during the startup on June 21 (see Table B-5 starting from sample B88-06-R14-FC1). Titanium and chromium were transported mainly in filterable form in most sampling locations.

One of the difficulties with non-filterables is to collect a reasonable amount of sample for analysis, especially for titanium. Increasing sampling time by overlapping several runs may not be practical during power ramp periods. Also, the present setup does not allow more IX resin paper samplers to be attached to the system.

The molar ratios of the elements (with respect to iron) in the non-filterables were generally higher than similar ones in the filterables (see Table B-6). In a number of blowdown samples, the ratio for manganese in the non-filterables was significantly higher than one.

(b) Corrosion Product Transport

Particulate Transport

Cumulative transport of the particulates at 4 sampling points in the feedtrain is shown in Figure 4.2.14. Transport at the steam generator inlet was not estimated since no sample could be obtained during this sampling campaign.

From June 17 to 19, although the condensate system was still the largest source, the contribution from the deaerator was very significant. It was learned that during the extended shutdown from mid-April to mid-June,

- The condenser, LP heaters, HP heaters and preheaters were filled with hydrazine dosed water;
- one bank of boilers (4 units) was filled with hydrazine dosed water, the other bank was empty;
- the deaerator was open to air; and
- the turbines were open to air.

Since the deaerator was open to air for an extended period of time, significant material corrosion might occur. During startup, the corrosion products were sloughed off and carried into the steam generators. From June 17 to 19, at least 15 kg of particulates were transported into the steam generators (based on transport at the preheater outlet) compared with about 300 grams during the June 21 to 24 startup (see Figure 4.2.14). These results show that minimizing corrosion in the secondary system during extended shutdowns is very important.

Cumulative transport of the particulates in the reheater drains is shown in Figure 4.2.20. From June 17 to 19, about 1.8 kg of suspended solids were carried into the steam generators. This suggests that significant corrosion also occurred in the reheaters during the extended shutdown.

Boiler blowdown cumulative transport is shown in Figure 4.2.26. During power ramp periods, sludge removal by blowdown was relatively small, but increased significantly during the shutdown on June 19. From June 17 to 19, about 400 g of corrosion products were removed while at least 16.8 kg of suspended solids were carried into the steam generators (based on the transport at the reheater drains and the preheater outlet). Therefore, blowdown is not an effective method in preventing sludge buildup. From June 20 to 24, sludge removal remained very low, except for the inflated removal of about 2.5 kg of corrosion products by intermittent blowdown on June 23.

Element Transport

Iron was the major element in transport. Cumulative transport of the elements in the feedtrain and the reheater drains followed a trend similar to that of the particulates, except titanium (see Figures 4.2.15 to 4.2.19 and 4.2.21 to 4.2.25). Cumulative transport of the elements in the blowdown lines was not calculated because of suspected errors in some of the chemical analysis. Transport behaviours of the elements and particulates are summarized in Table 4.2. The preheater appeared to be a prime location for sludge deposition.

5.0 CONCLUSIONS

1. Corrosion product transport at Bruce 7 was studied during shutdown (April/1988) and startup (June/1988). Elevated concentration levels were observed in all sampling locations, except boiler blowdown during startup periods.

2. The condensate system apeared to be the main source and the preheater an important location for sludge deposition.

3. Corrosion product ingress to the steam generators increased significantly during reactor startup and shutdown. Compared with the sludge ingress during steady load full power operation, the ingress during the April 13 - 15 shutdown was not significant (approximately 0.7 kg) but that of the June 17 - 19 startup was very substantial, at least 16.8 kg went in.

4. During the shutdown in April, the deaerator was a prime location for deposition. However, during the June startup, it released a substantial amount of corrosion products. This implied that significant corrosion might have occured in the deaerator during the maintenance period from April to June/1988.

5. Sludge removal appeared to be inflated when intermittent blowdown was applied. Further investigation (to be conducted by Bruce B), such as monitoring the concentration of corrosion products during the whole course of intermittent blowdown, is recommended.

6. Iron is the major element in transport at Bruce 7 and is transported mainly in filterable form. However, the non-filterable form could also become a predominant species, eg, iron and manganese at the condensate extraction pump discharge during the startup on April 14.

7. In these surveys, monitoring the transport of the particulates appears to provide a reasonable description of the transport behaviours of the corrosion products in the secondary system. Since it only involves sample weighing, results may be obtained in a relatively short period of time.

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TABLE 2.1: MATERIAL OF CONSTRUCTION OF MAJOR FEEDTRAIN COMPONENTS IN BRUCE 7

COMPONENT	TUBE	TUBESHEET	SUPPORT PLATE
Condenser	S30403	A285C A240 - 304C Overlay	
LP Heater	S30403		
HP Heater	S30403		
Moisture Separator	Carbon Steel		
Preheater	I600		
Steam Generator	N06600	SA508 Carbon Steel	SA516-70 Carbon Steel
Reheater	Carbon Steel	Carbon Steel	

TABLE 4.1: CORROSION PRODUCT TRANSPORT IN BRUCE 7 FEEDTRAIN
DURING APRIL, 1988 SHUTDOWN

Element in Tranport	Source+	Locations Showing Transport Increase*				Deposition	Release
		Power Trip Apr 14	Startup Apr 14	Load Follow Apr 15	Shutdown Apr 15		
Particulate	Condensate System	CEP BFP HP Htr 5A	CEP	CEP	CEP BFP HP Htr 5A	Deaerator HP Htr 5A Preheater	
Iron	Condensate System	CEP	CEP		CEP BFP HP Htr 5A	Deaerator Preheater	
Nickel	Condensate System	CEP BFP HP Htr 5A Preheater SG Inlet	CEP HP Htr 5A Preheater SG Inlet	CEP SG Inlet	CEP BFP HP Htr 5A SG Inlet	Deaerator Preheater	HP Htr 5A Reheater
Titanium	Reheater Drain		BFP SG Inlet		CEP BFP HP Htr 5A	HP Htr 5A	Deaerator
Manganese	Condensate System		CEP			Deaerator	Reheater
Chromium	HP Htr 5A	CEP BFP HP Htr 5A	CEP HP Htr 5A SG Inlet	CEP SG Inlet	CEP BFP HP Htr 5A SG Inlet	Deaerator Preheater	Condensate System

+ Source implies location where corrosion product release for that particular species is the highest within a specified period.

* This applies to point to point comparison in a cumulative transport graph. If the slope of the curve is over 25 degrees approximately, the increase is considered significant.

TABLE 4.2: (A) CORROSION PRODUCT TRANSPORT IN BRUCE 7 FEEDTRAIN
DURING JUNE 17, 1988 STARTUP

ELEMENT IN TRANSPORT	SOURCE*	LOCATIONS SHOWING TRANSPORT INCREASE**		DEPOSITION	RELEASE
		STARTUP JUNE 17	POWER TRIP JUNE 20		
Particulate	Deaerator	4 locations***	4 locations***	HP Htr 5A Preheater	
Iron	Deaerator	4 locations	4 locations	HP Htr 5A Preheater	
Nickel	Deaerator	4 locations	4 locations	HP Htr 5A (up to power trip) Preheater	HP Htr 5A (during power trip)
Titanium	Condensate System	4 locations	4 locations	Preheater	HP Htr 5A
Manganese	Deaerator	4 locations	4 locations	HP Htr 5A Preheater	
Chronium	Deaerator	4 locations	4 locations	HP Htr 5A Preheater	

* Source implies location where corrosion product release for that particular species is the highest during a specified period.

** This applies to point to point comparison within a cumulative transport graph. If the slope of the curve is 25 degrees, the increase is considered significant.

*** The 4 locations are CEP, BFP, HP Htr 5A and Preheater.

TABLE 4.2: (B) CORROSION PRODUCT TRANSPORT IN BRUCE 7 FEEDTRAIN
DURING JUNE 21, 1988 STARTUP

ELEMENT IN TRANSPORT	SOURCE*	LOCATIONS SHOWING TRANSPORT INCREASE**	DEPOSITION	RELEASE
Particulate	Condensate System	CEP BFP HP HTR 5A	Deaerator Preheater	HP Htr 5A
Iron	Condensate System (Initially)	CEP BFP HP Htr 5A	Deaerator Preheater	HP Htr 5A
Nickel	HP Htr 5A	HP Htr 5A	Preheater	Deaerator
Titanium	Preheater	BFP Preheater	HP Htr 5A	Deaerator
Manganese	Condensate System	CEP BFP HP Htr 5A	Deaerator (Initially) Preheater	HP Htr 5A (Initially) Deaerator (later stage)
Chronium	Deaerator (later stage)	Preheater (Initially) CEP	Preheater (later stage)	

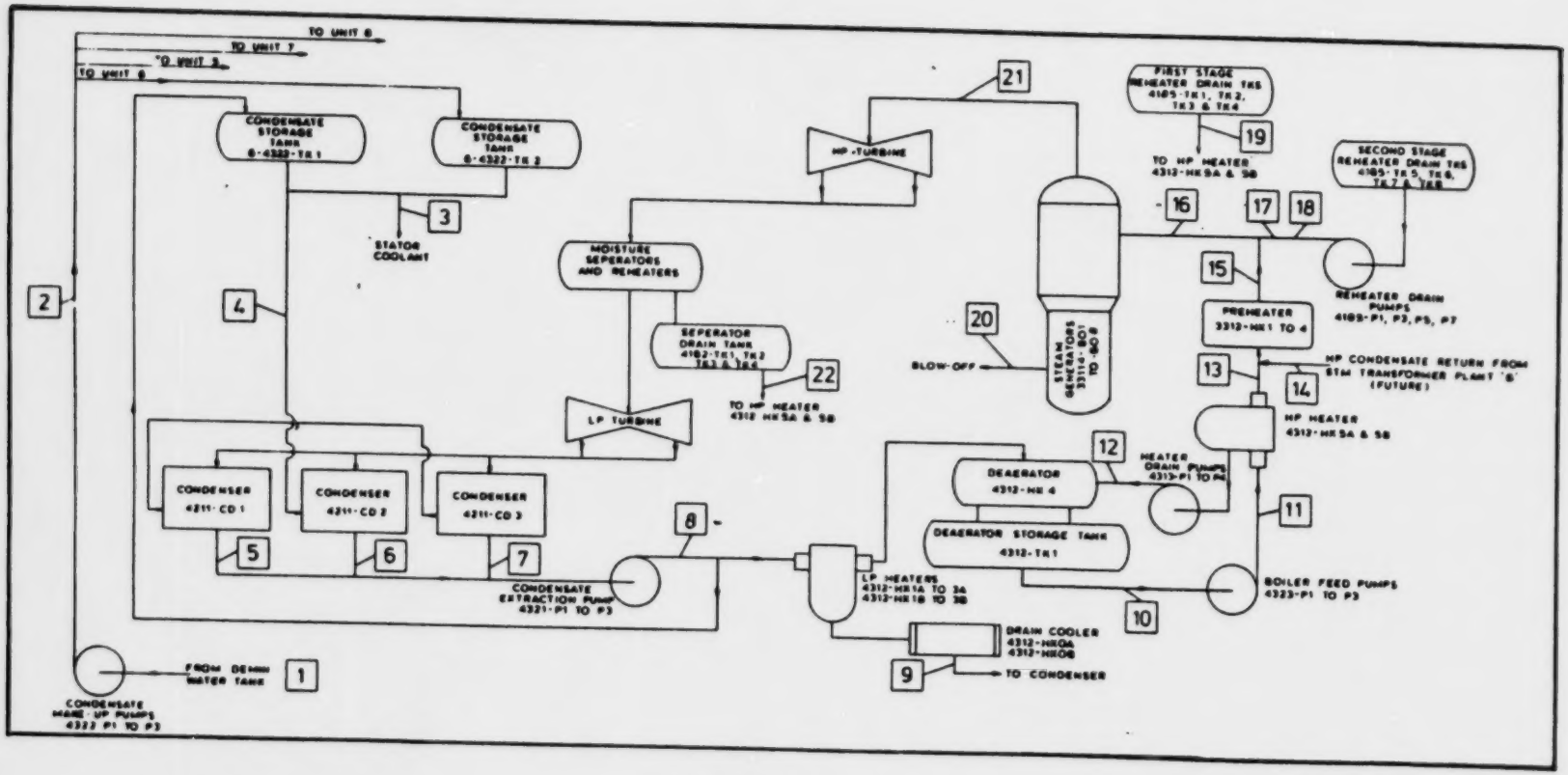


FIGURE 2.1

Diagram for Sources of Steam and Feedwater Sampling Flows in a Bruce "B" Secondary System

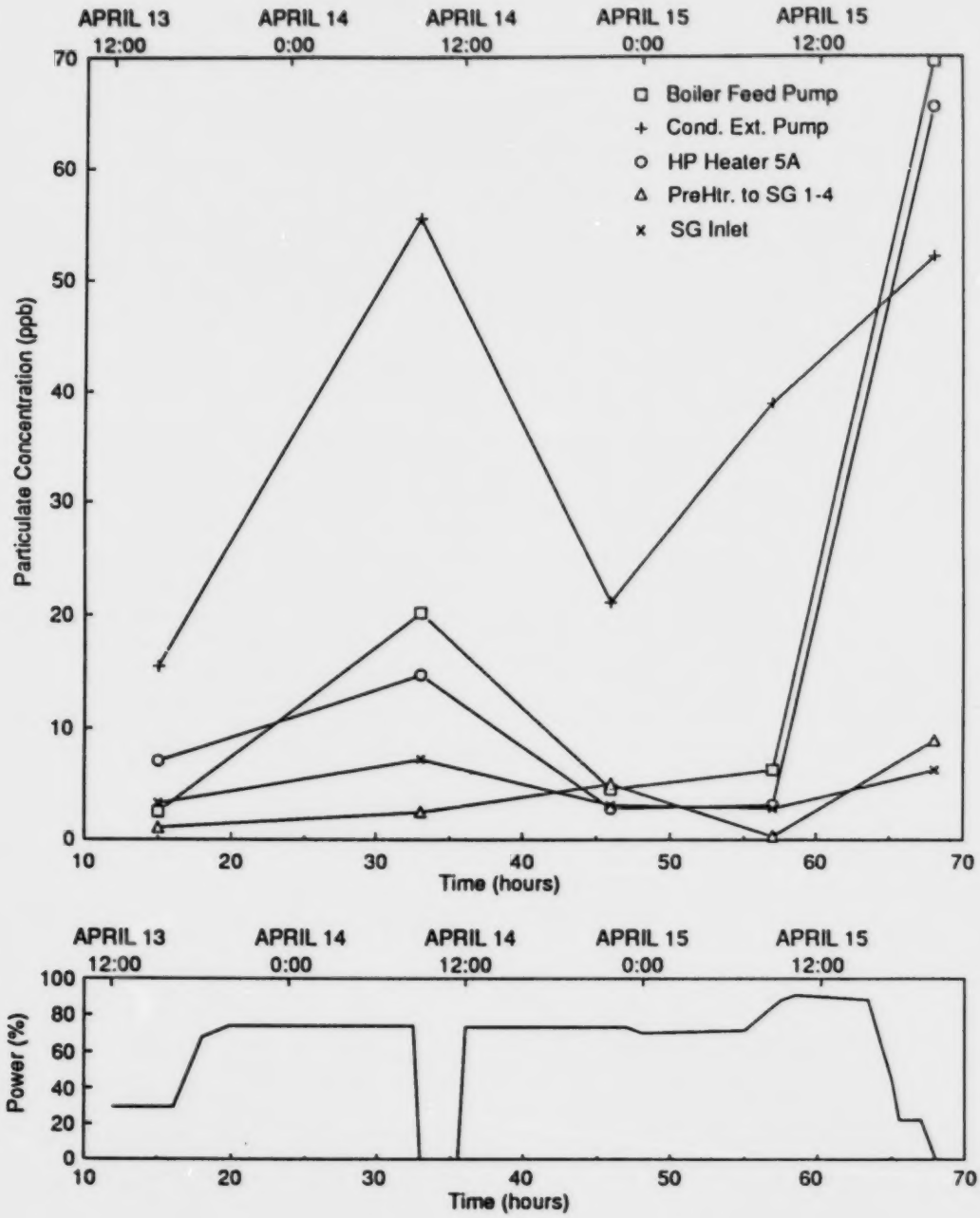


FIGURE 4.1.1

PARTICULATE CONCENTRATION PROFILE IN
FEEDWATER SYSTEM OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

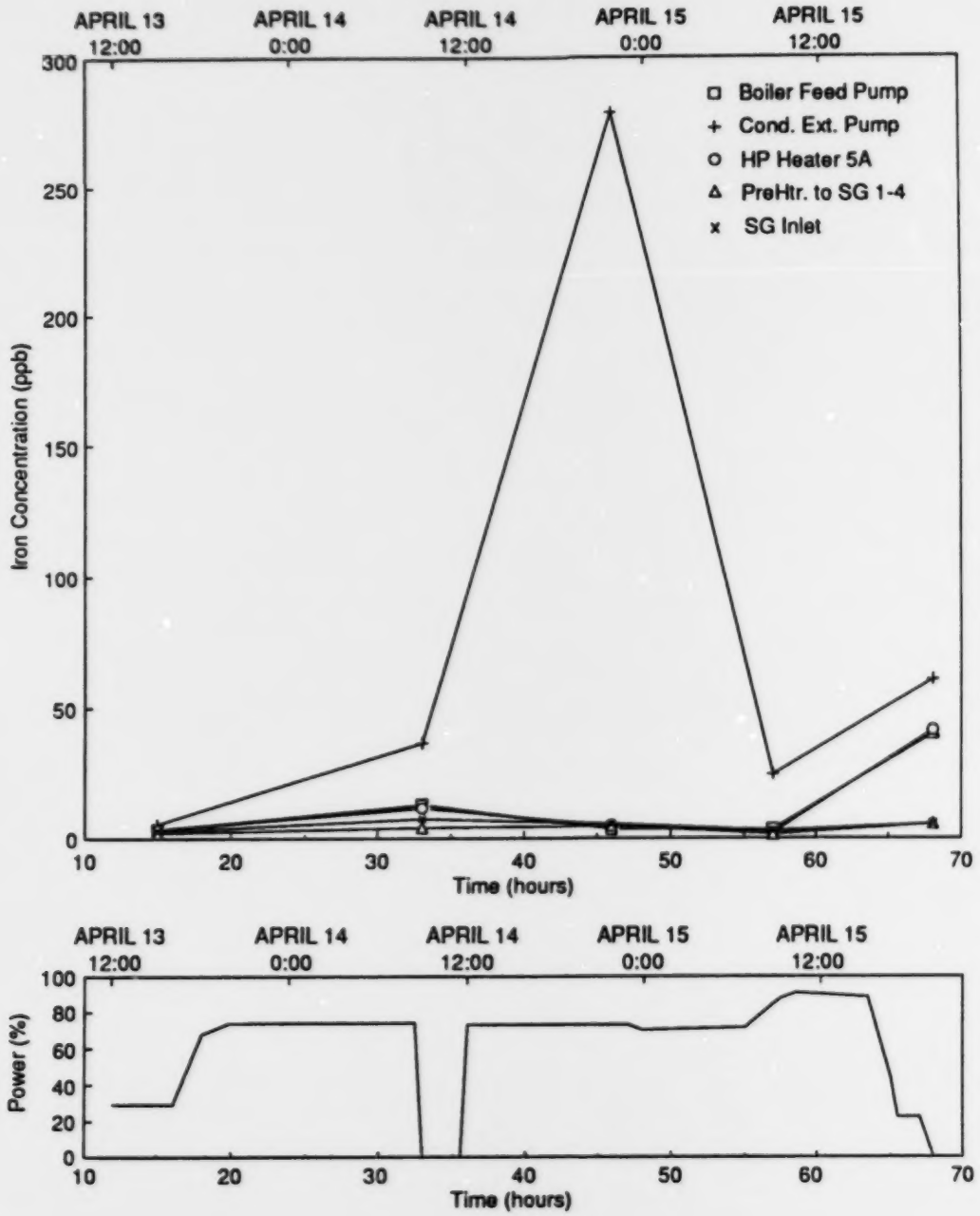


FIGURE 4.1.2

IRON CONCENTRATION PROFILE IN FEEDWATER SYSTEM OF BRUCE B-7 DURING APRIL 1988 SHUTDOWN

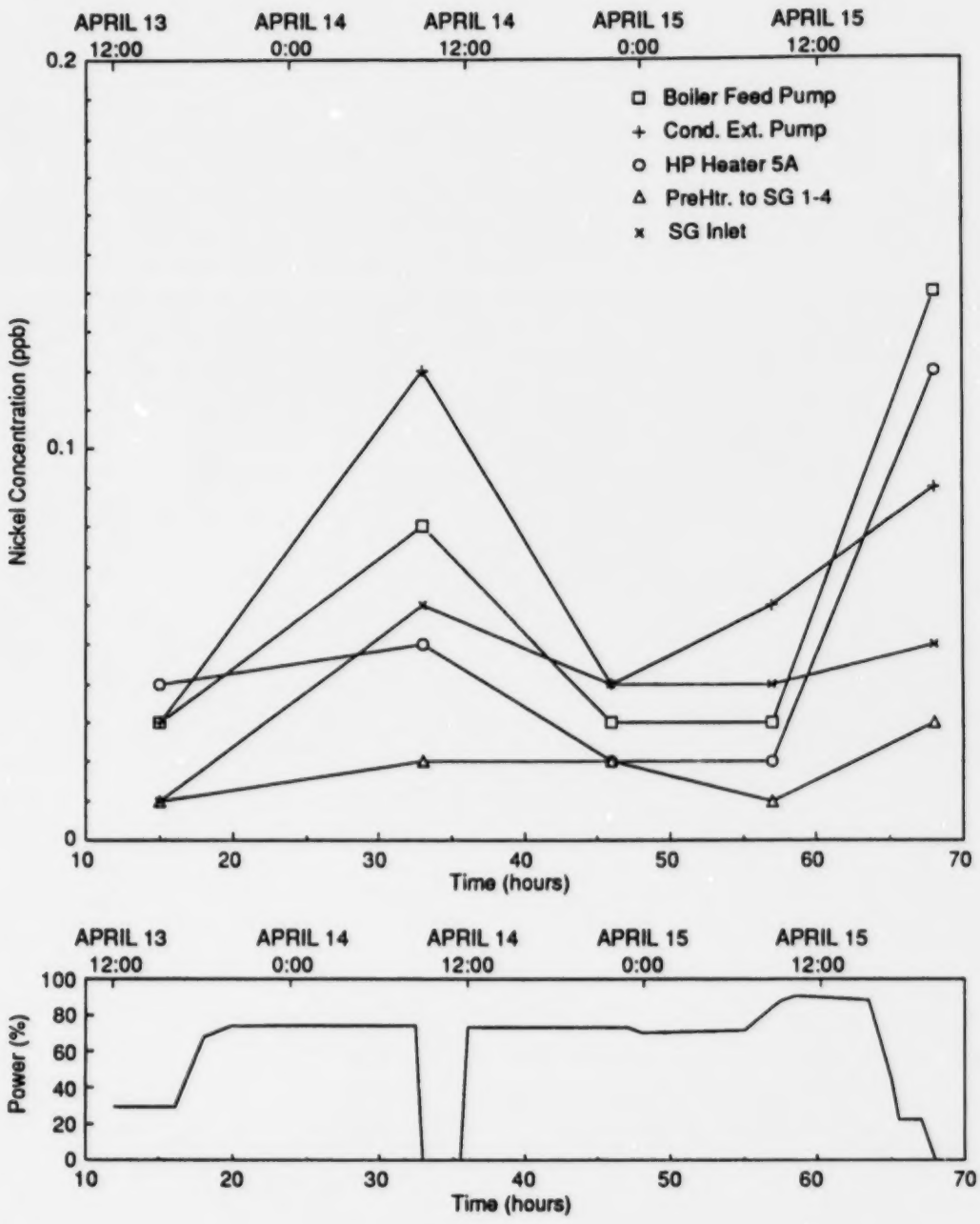


FIGURE 4.1.3

NICKEL CONCENTRATION PROFILE IN
FEEDWATER SYSTEM OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

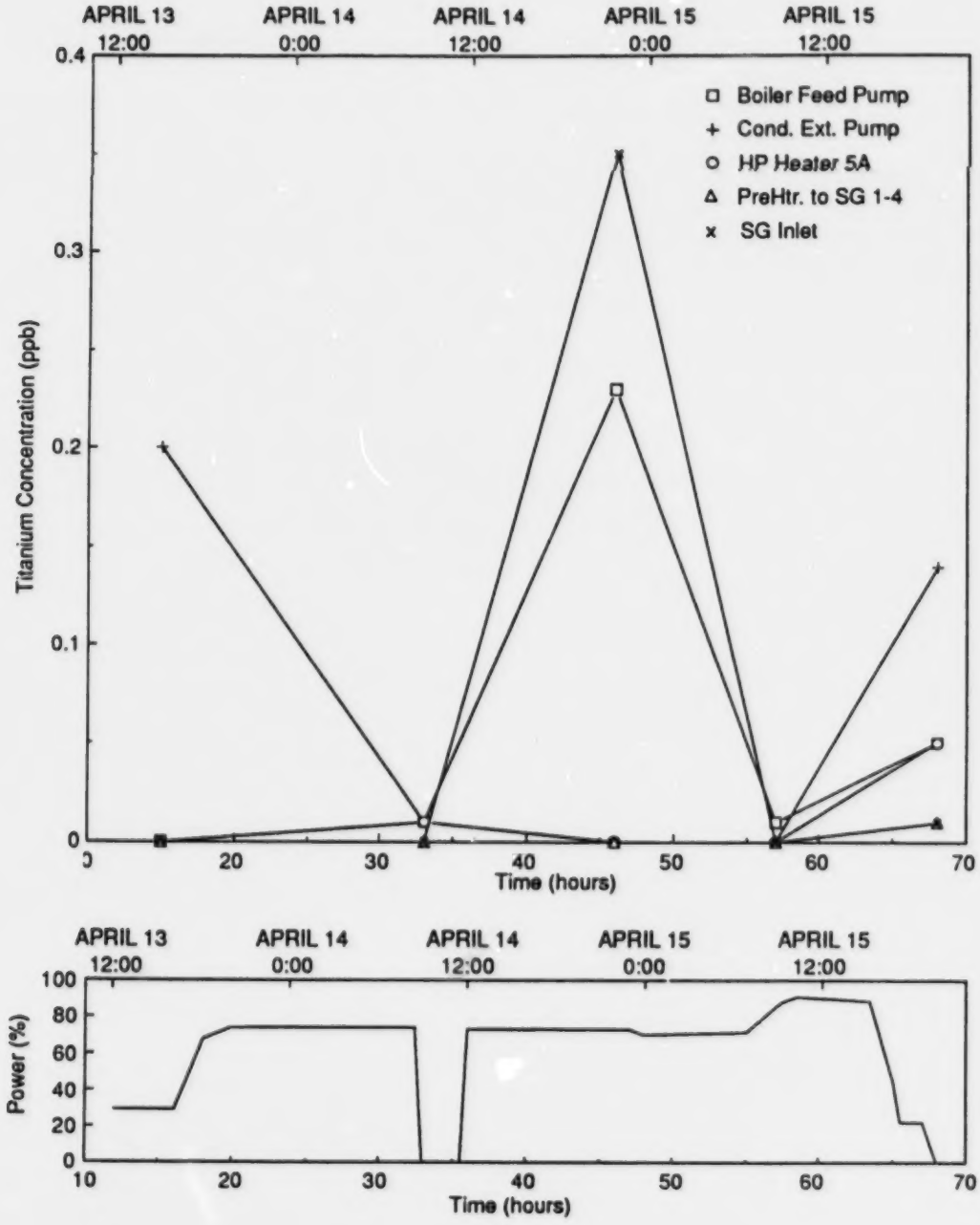


FIGURE 4.1.4

TITANIUM CONCENTRATION PROFILE IN
FEEDWATER SYSTEM OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

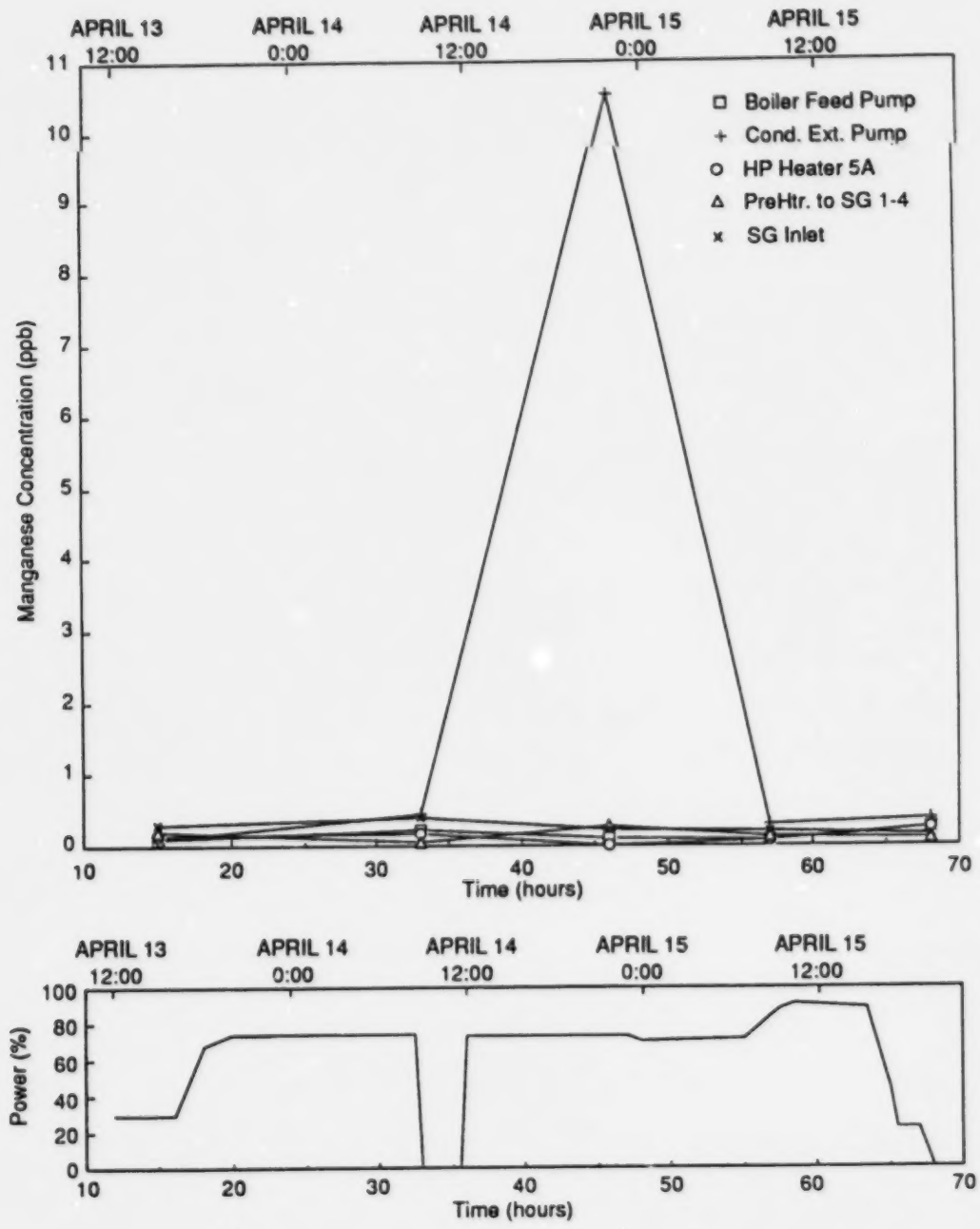


FIGURE 4.1.5

MANGANESE CONCENTRATION PROFILE IN
FEEDWATER SYSTEM OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

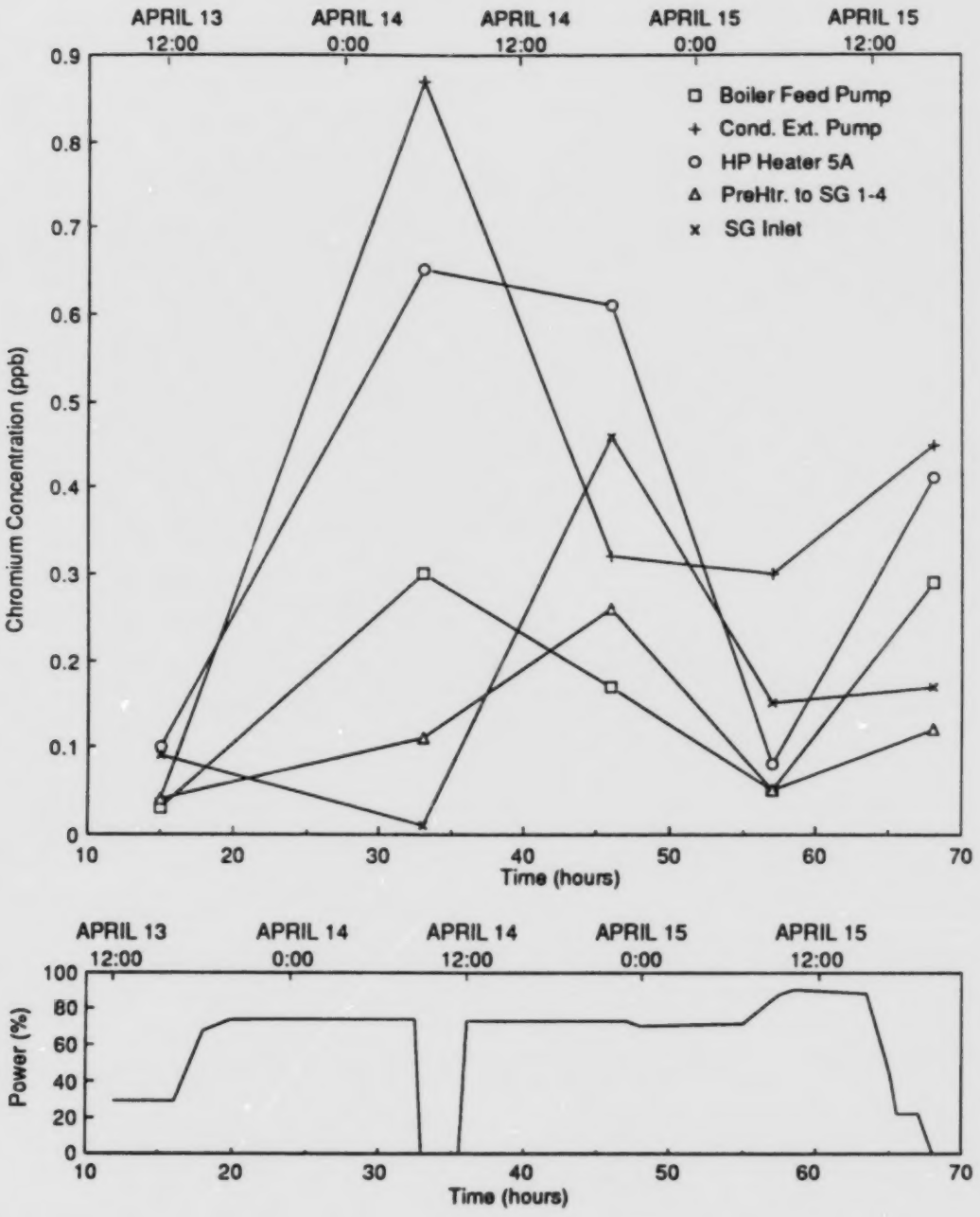


FIGURE 4.1.6

CHROMIUM CONCENTRATION PROFILE IN
FEEDWATER SYSTEM OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

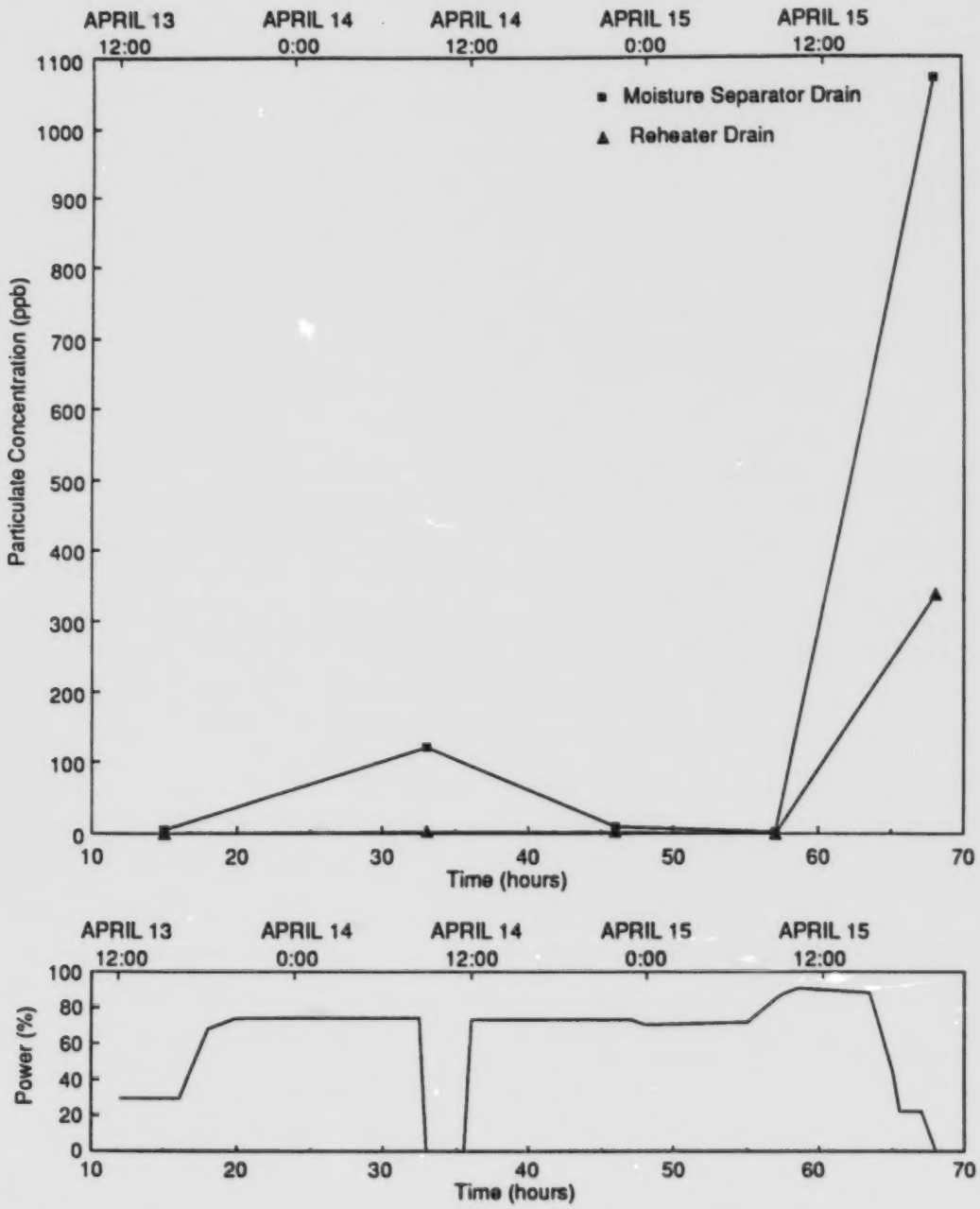


FIGURE 4.1.7

PARTICULATE CONCENTRATION PROFILE IN
DRAIN SYSTEMS OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

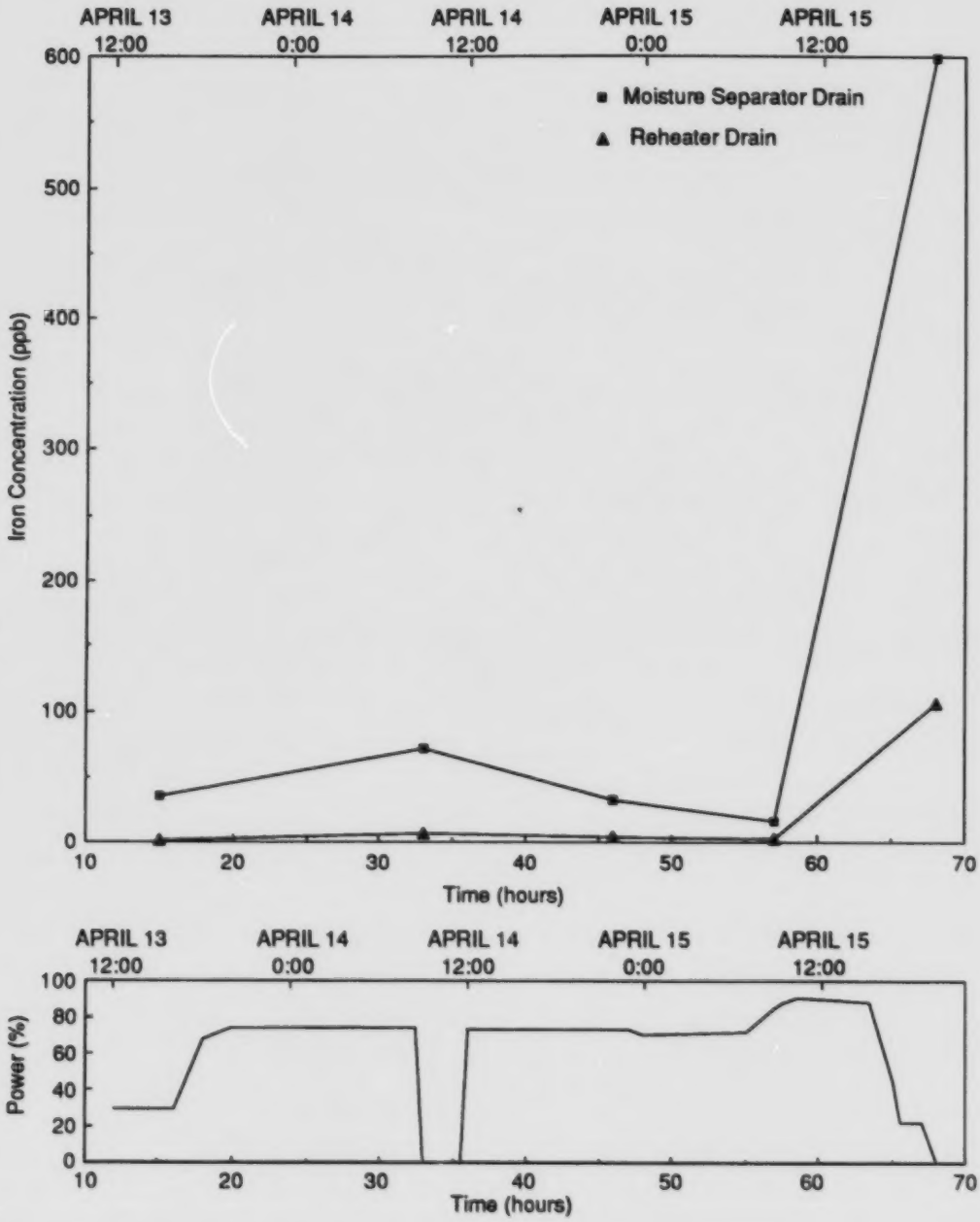


FIGURE 4.1.8

IRON CONCENTRATION PROFILE IN
DRAIN SYSTEMS OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

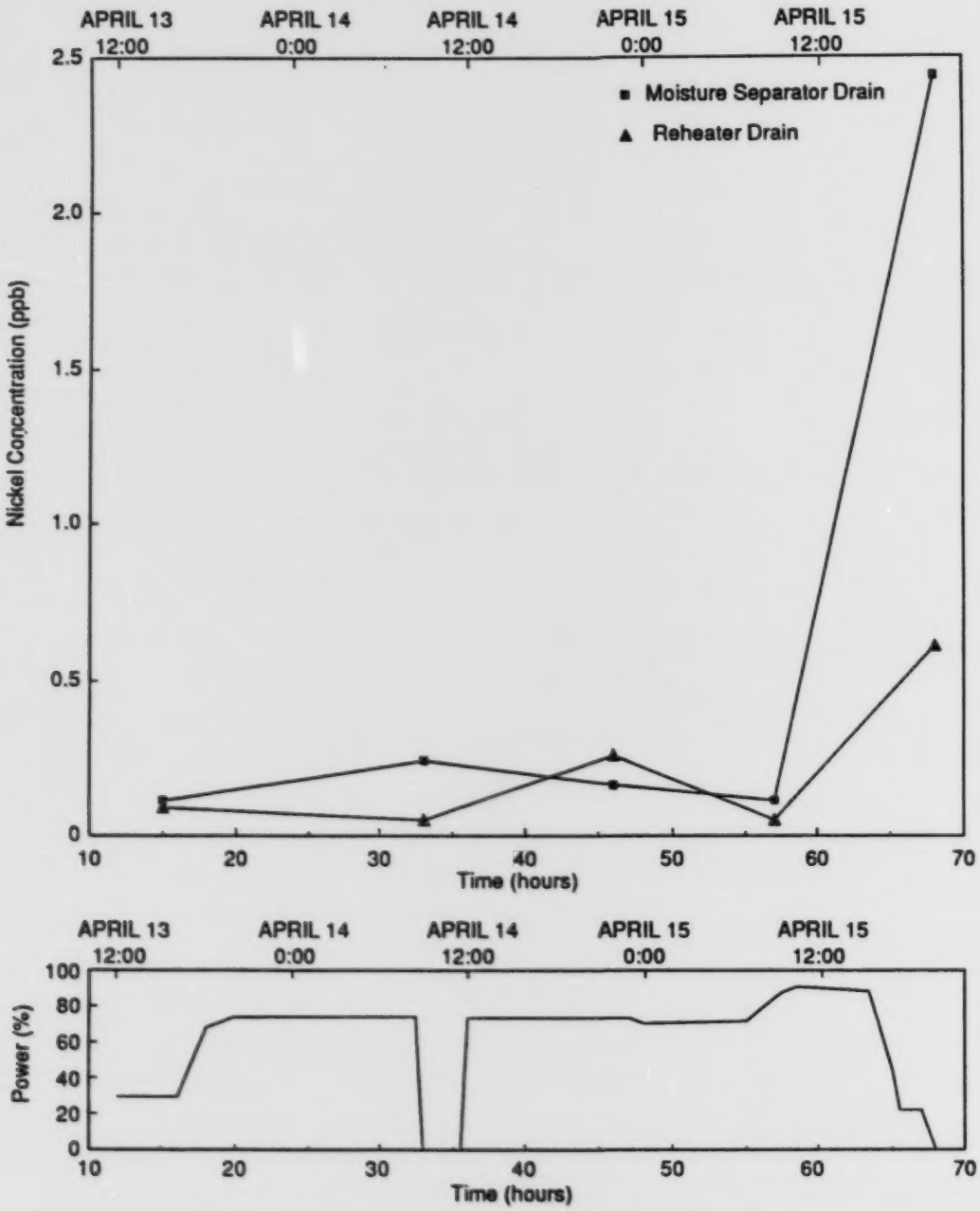


FIGURE 4.1.9

NICKEL CONCENTRATION PROFILE IN
DRAIN SYSTEMS OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

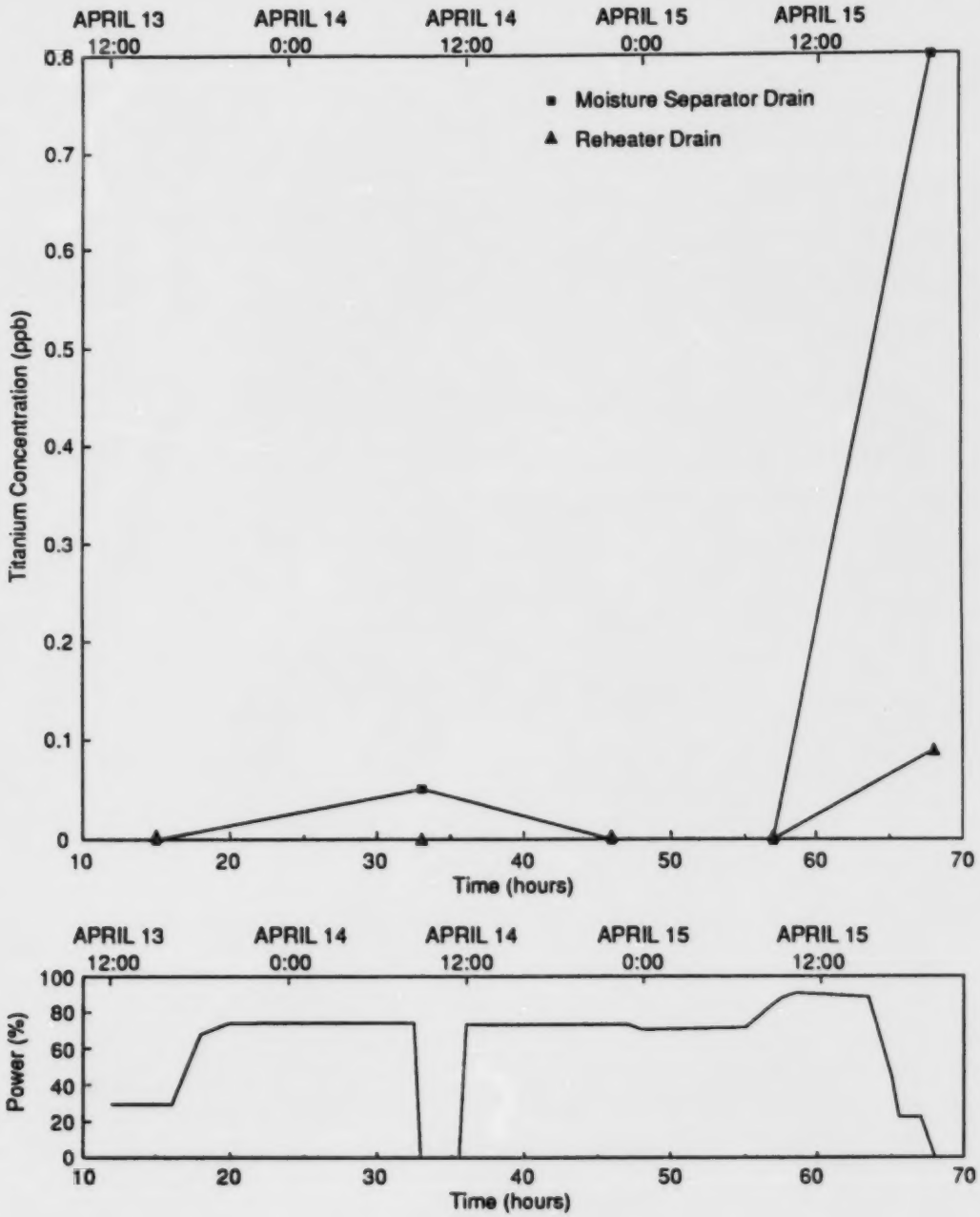


FIGURE 4.1.10

TITANIUM CONCENTRATION PROFILE IN
DRAIN SYSTEMS OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

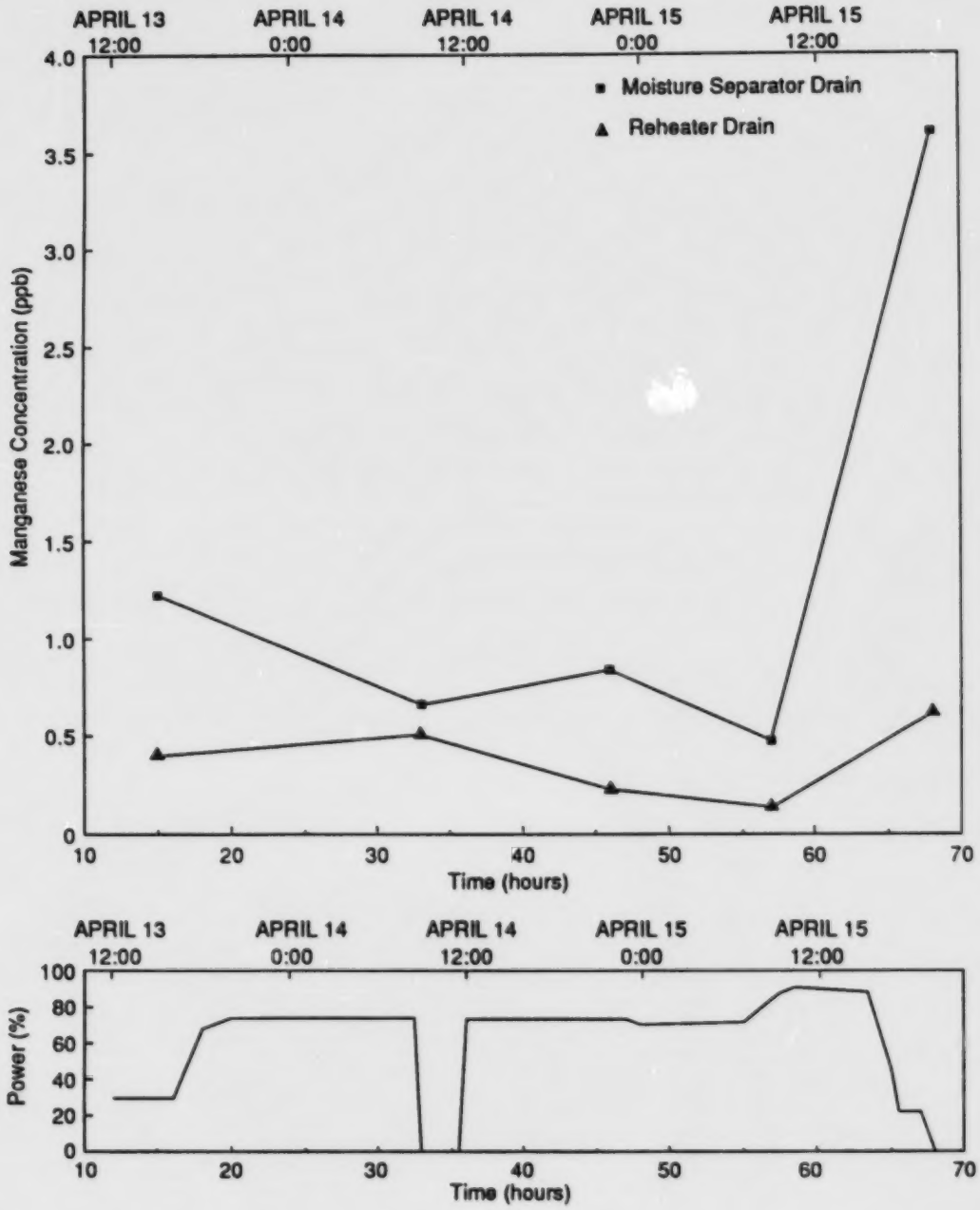


FIGURE 4.1.11

MANGANESE CONCENTRATION PROFILE IN
DRAIN SYSTEMS OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

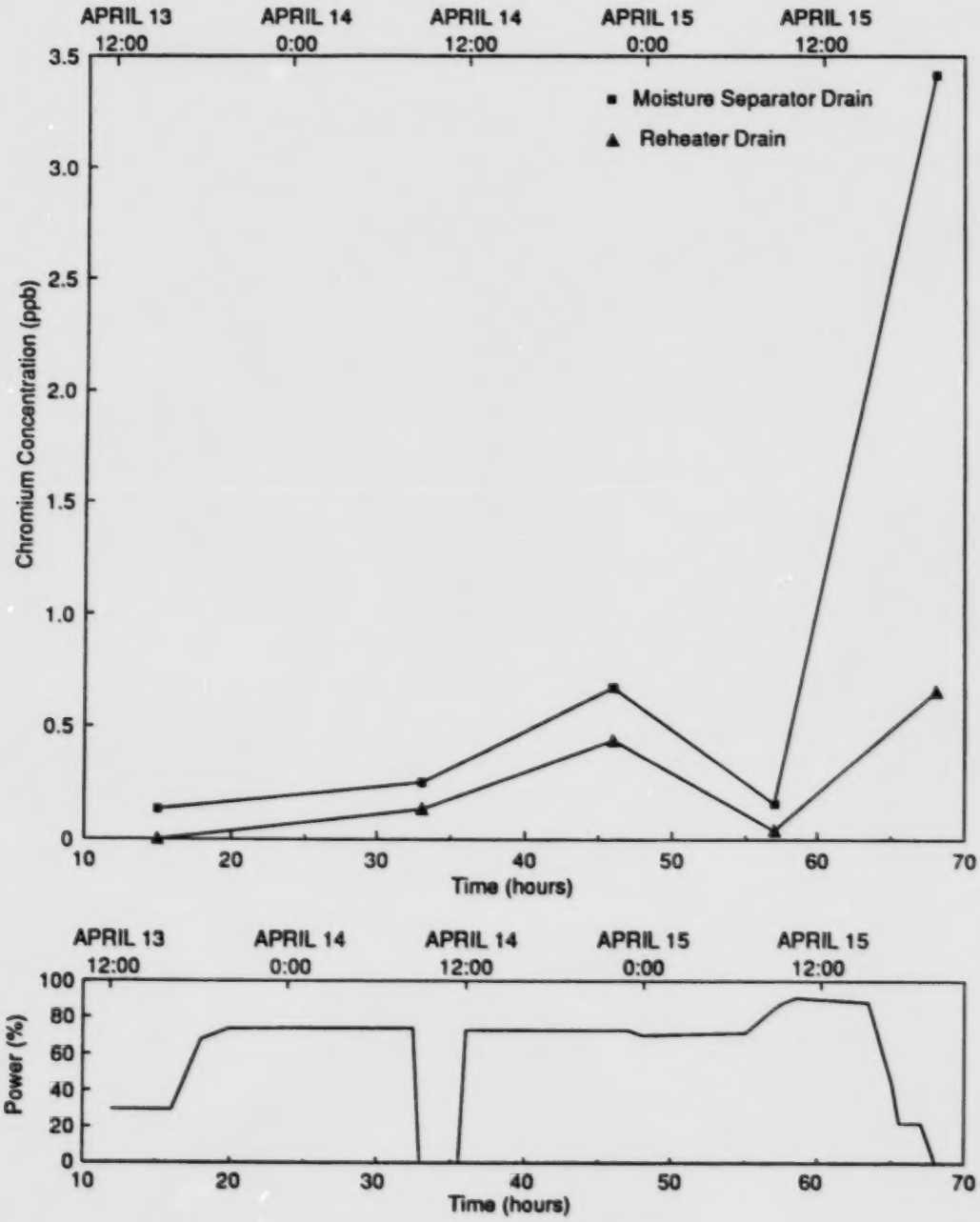


FIGURE 4.1.12

CHROMIUM CONCENTRATION PROFILE IN
DRAIN SYSTEMS OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

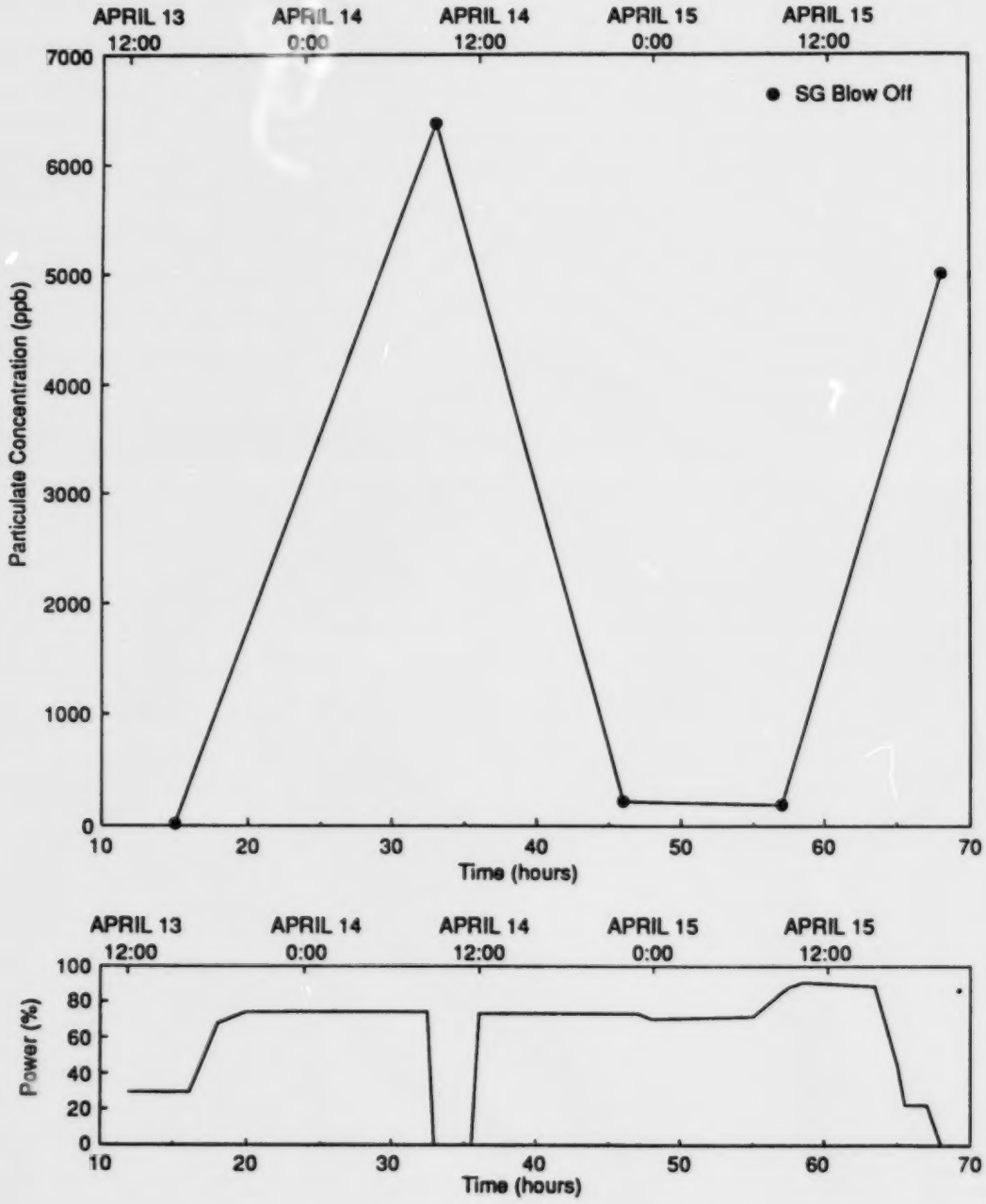


FIGURE 4.1.13

PARTICULATE CONCENTRATION PROFILE IN
STEAM GENERATOR BLOWOFF OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

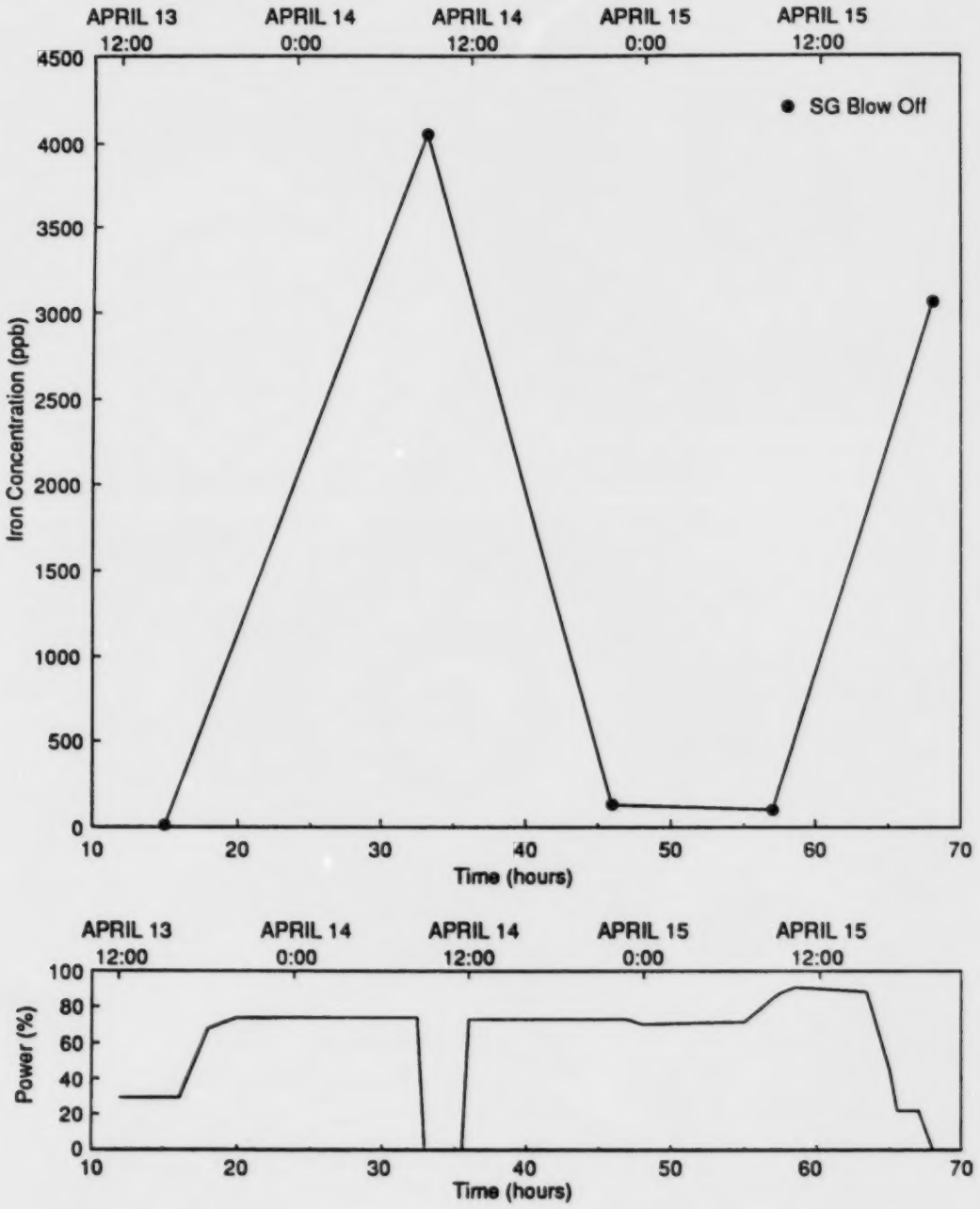


FIGURE 4.1.14

IRON CONCENTRATION PROFILE IN
STEAM GENERATOR BLOWOFF OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

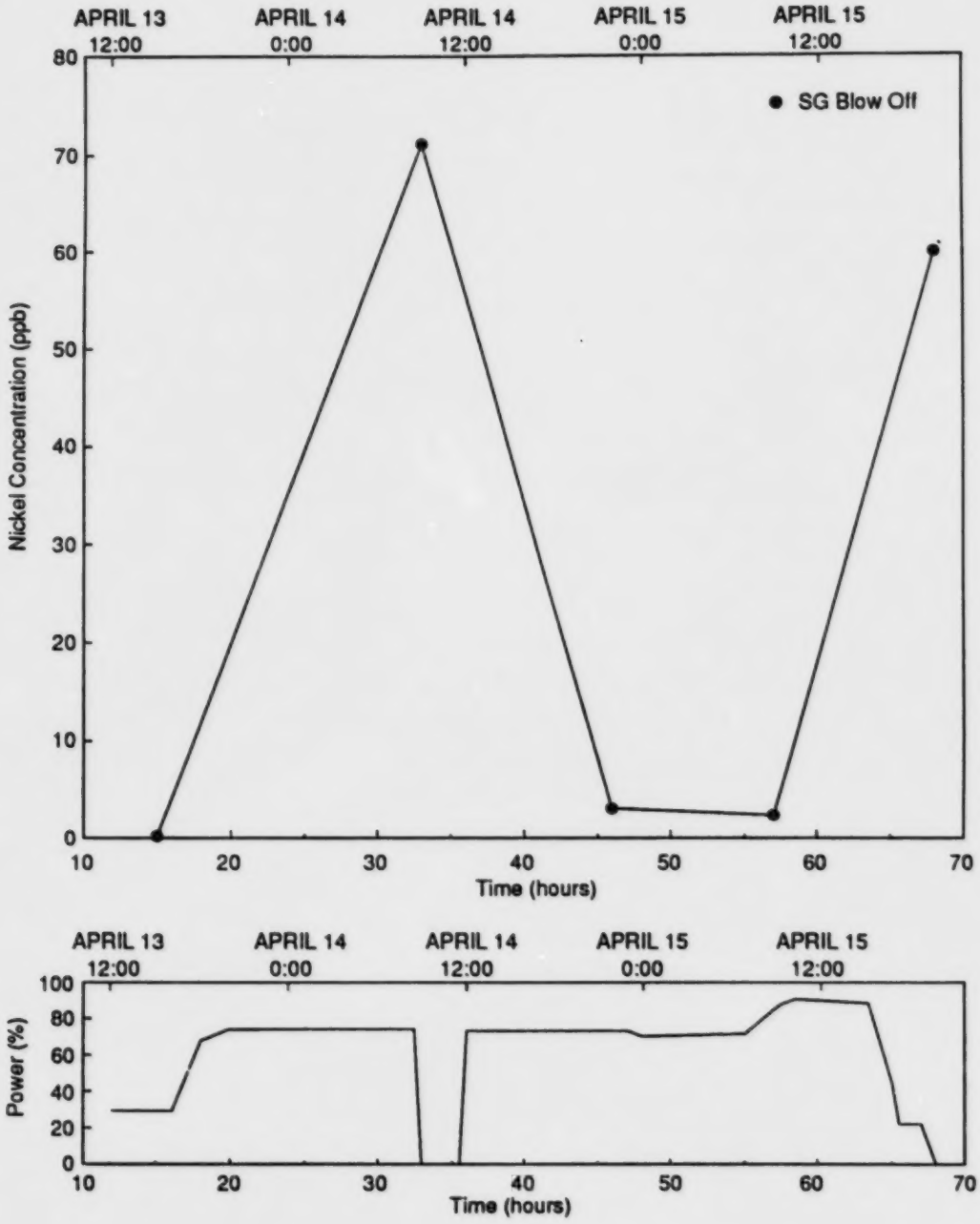


FIGURE 4.1.15

NICKEL CONCENTRATION PROFILE IN
STEAM GENERATOR BLOWOFF OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

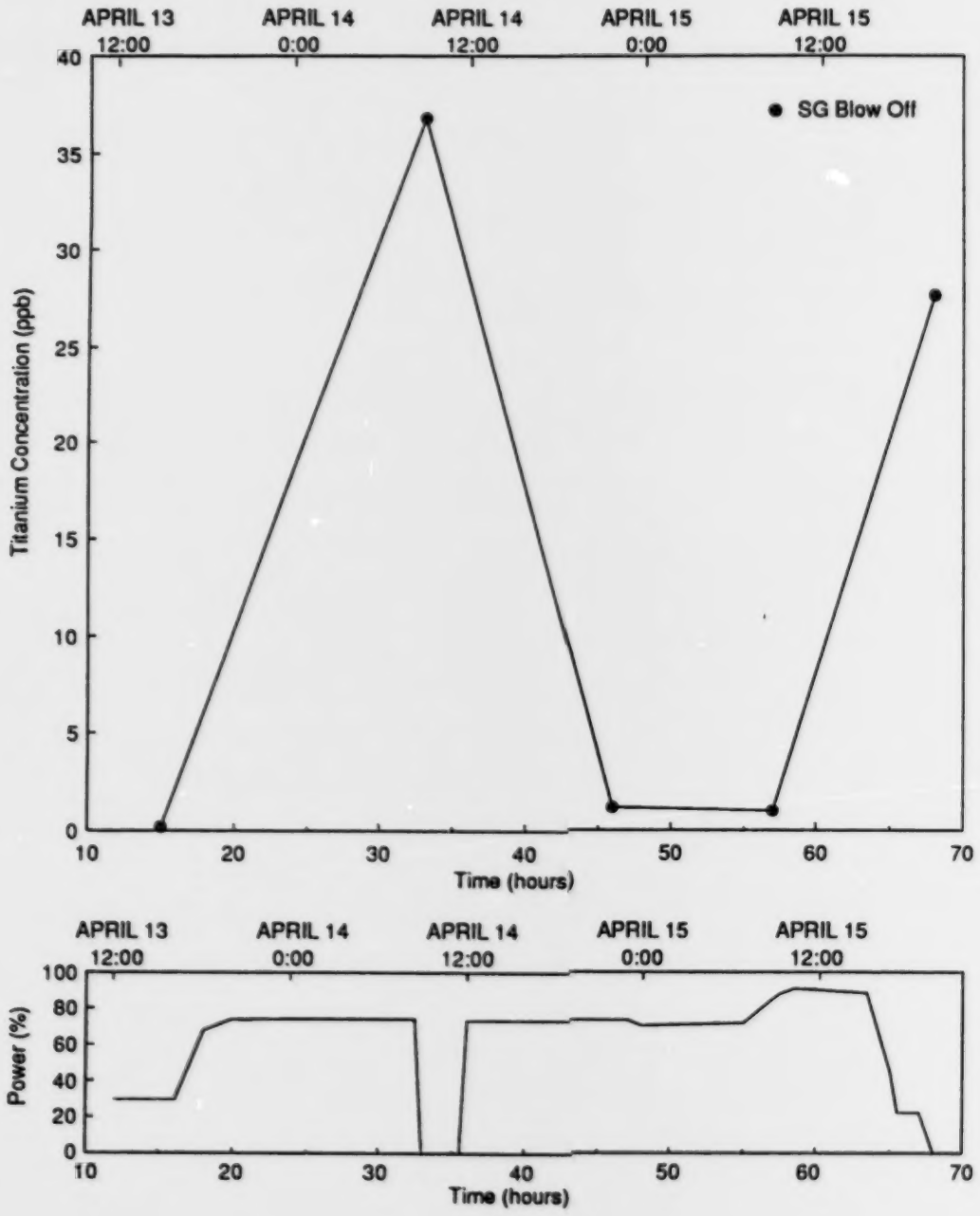


FIGURE 4.1.16

TITANIUM CONCENTRATION PROFILE IN
STEAM GENERATOR BLOWOFF OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

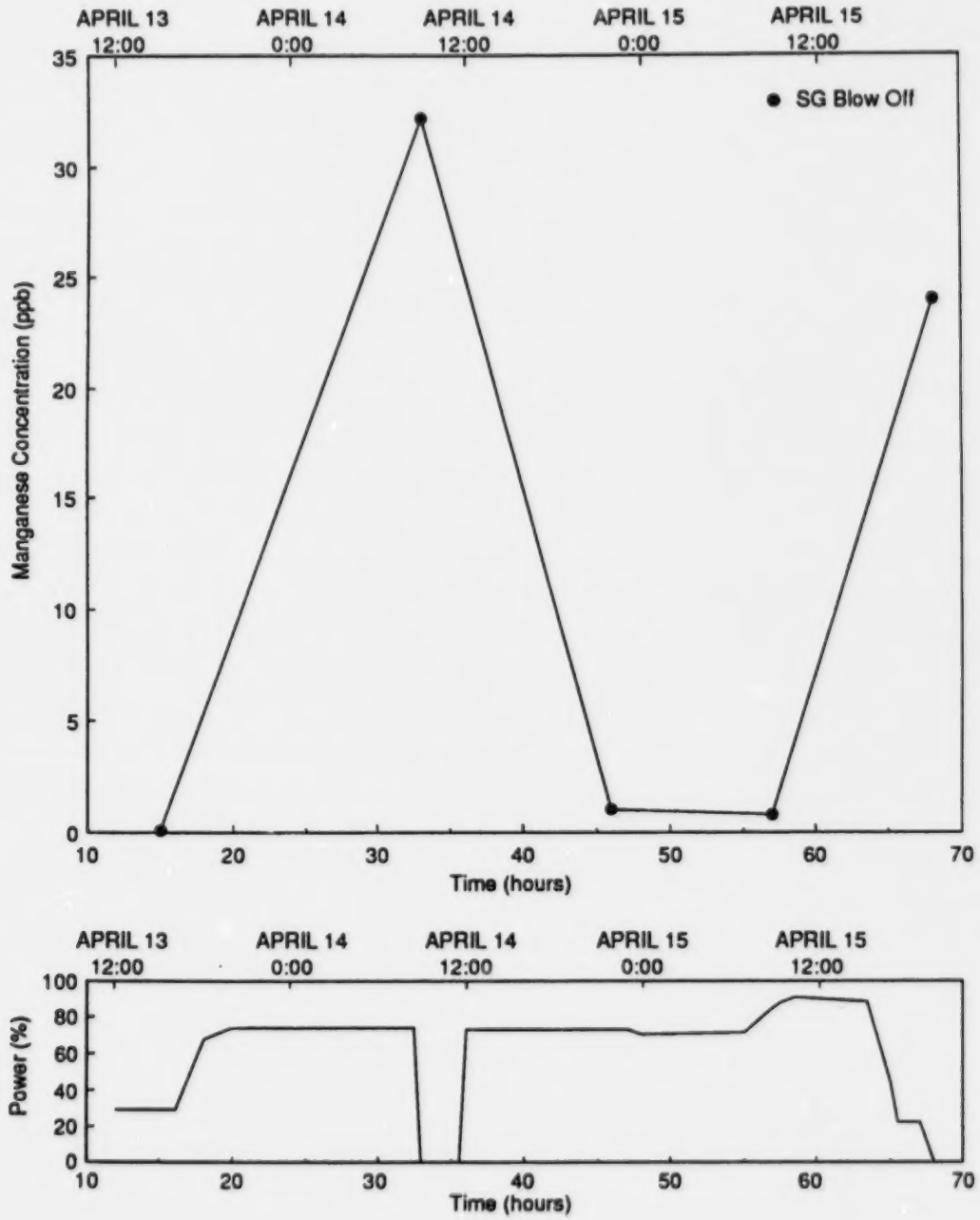
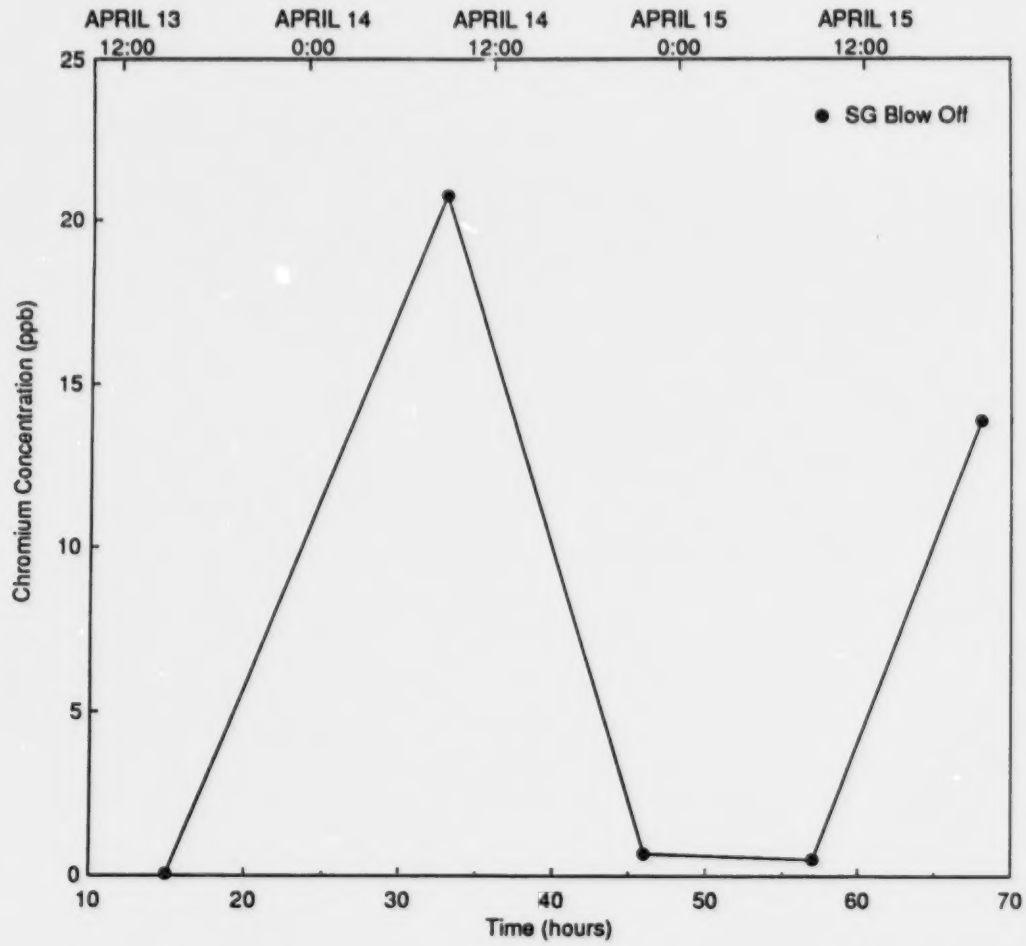


FIGURE 4.1.17

MANGANESE CONCENTRATION PROFILE IN
STEAM GENERATOR BLOWOFF OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN



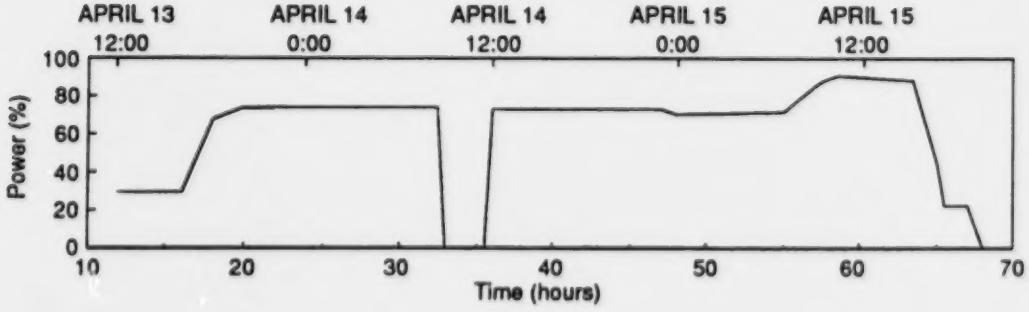


FIGURE 4.1.18

CHROMIUM CONCENTRATION PROFILE IN
STEAM GENERATOR BLOWOFF OF
BRUCE B-7 DURING APRIL 1988 SHUTDOWN

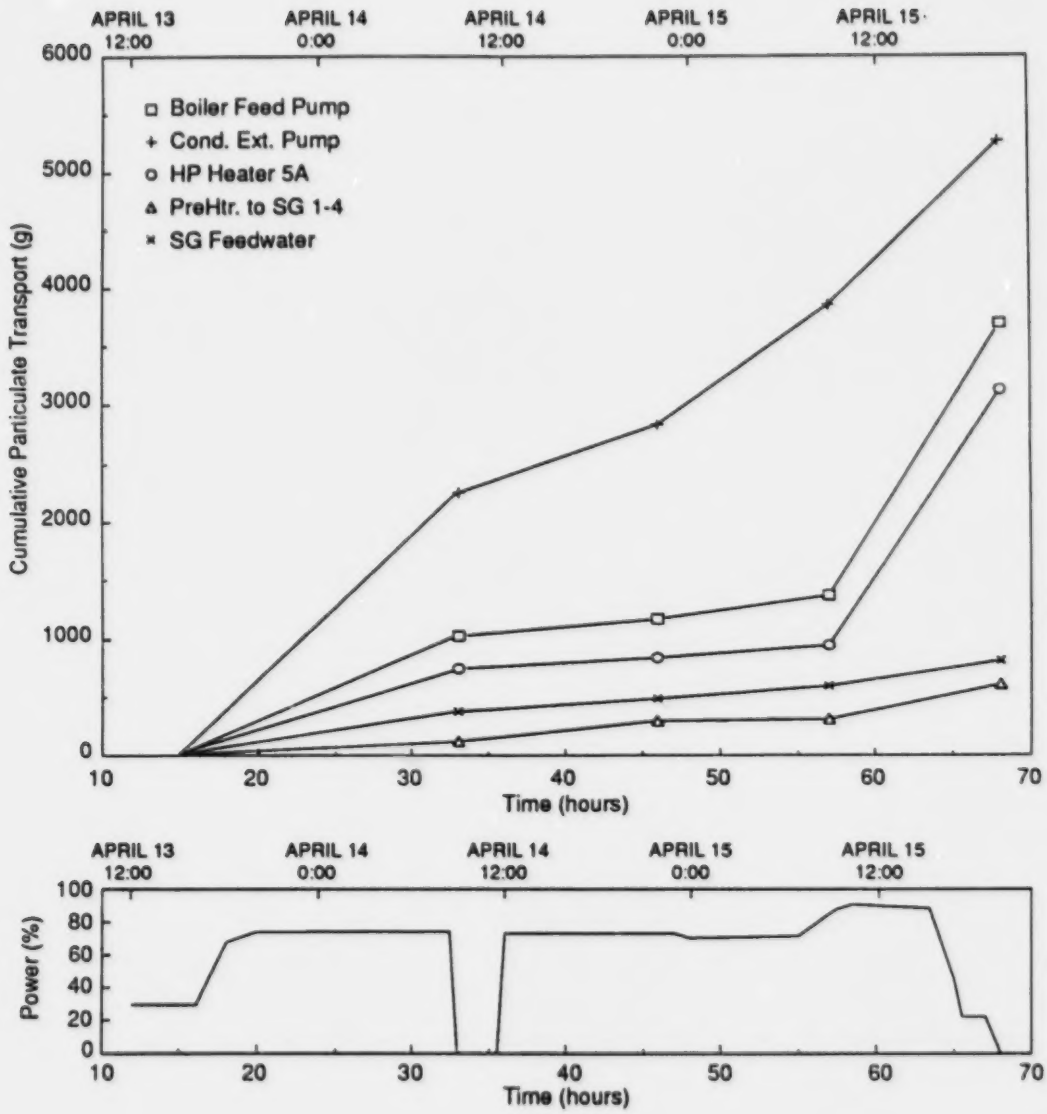


FIGURE 4.1.19

CUMULATIVE PARTICULATE TRANSPORT
IN FEEDTRAIN OF BRUCE B-7
DURING APRIL 1988 SHUTDOWN

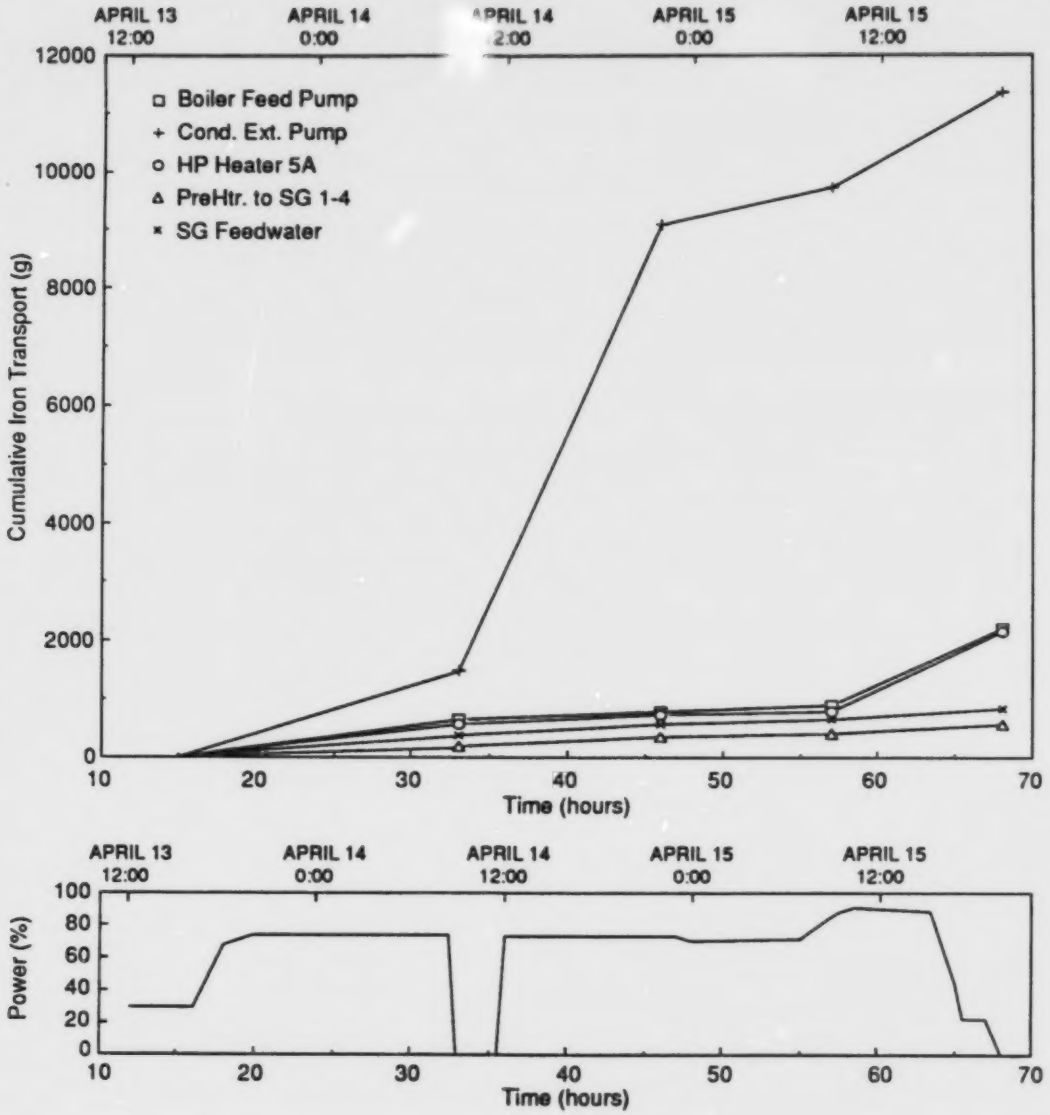


FIGURE 4.1.20

CUMULATIVE IRON TRANSPORT
IN FEEDTRAIN OF BRUCE B-7
DURING APRIL 1988 SHUTDOWN

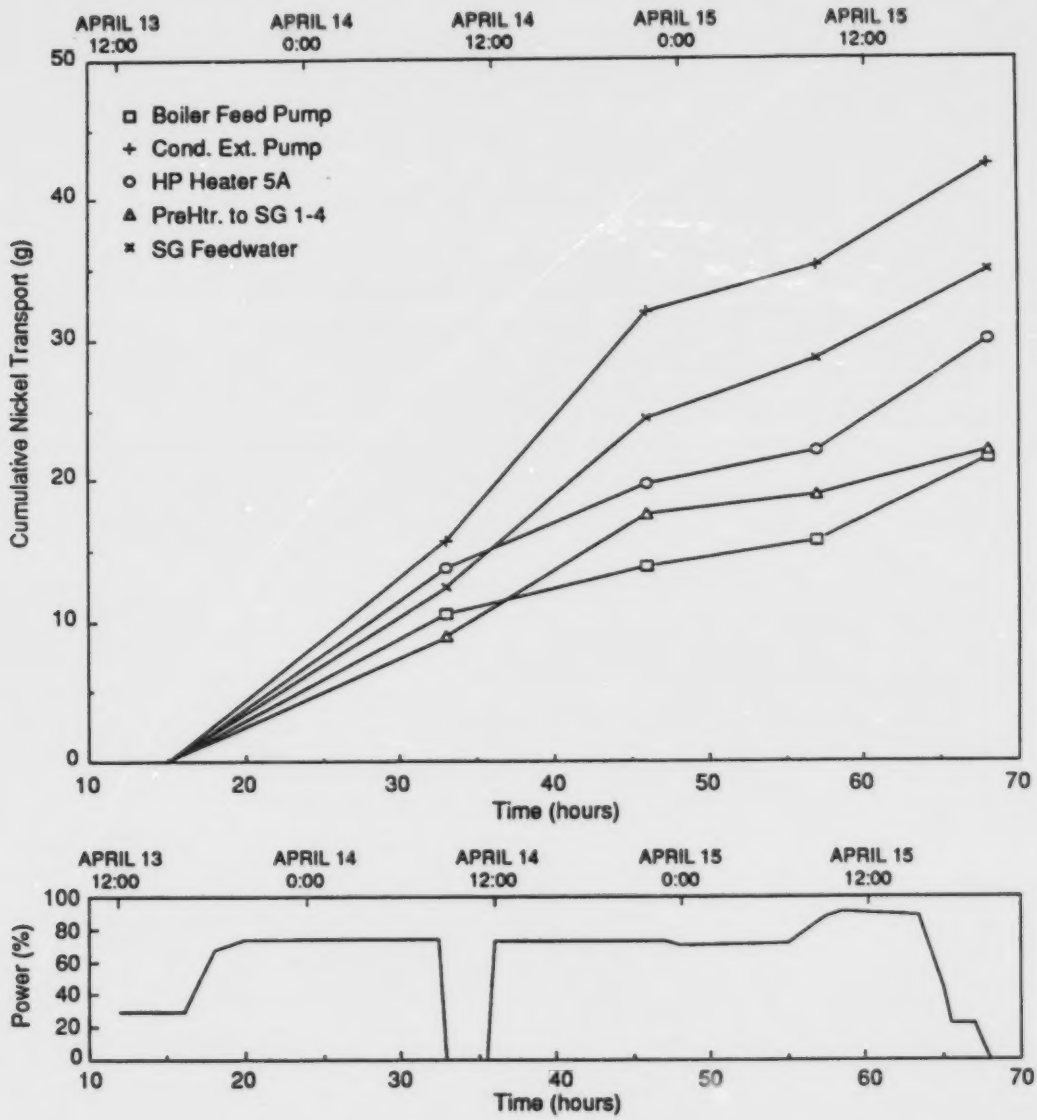


FIGURE 4.1.21

CUMULATIVE NICKEL TRANSPORT
IN FEEDTRAIN OF BRUCE B-7
DURING APRIL 1988 SHUTDOWN

179511-514-RD

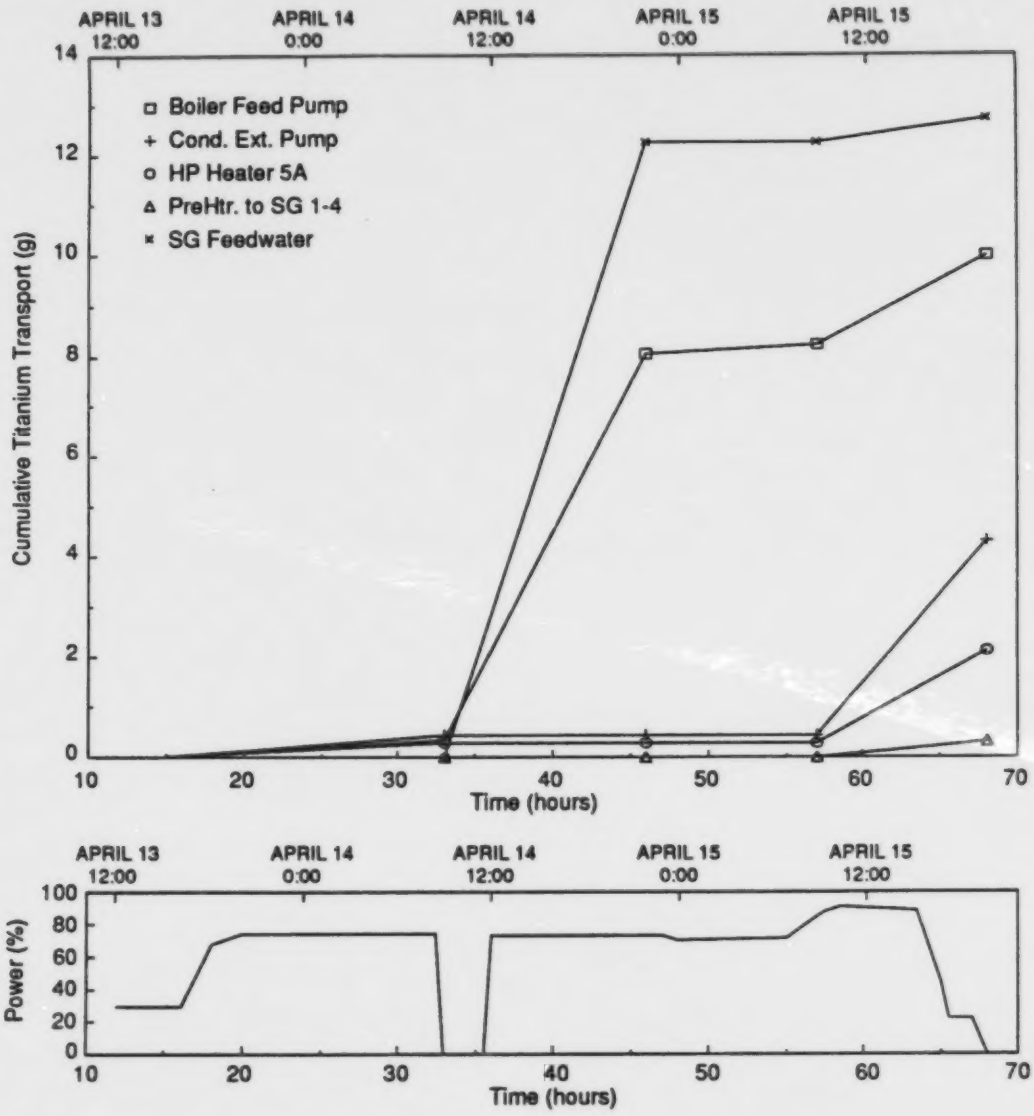


FIGURE 4.1.22

CUMULATIVE TITANIUM TRANSPORT
IN FEEDTRAIN OF BRUCE B-7
DURING APRIL 1988 SHUTDOWN

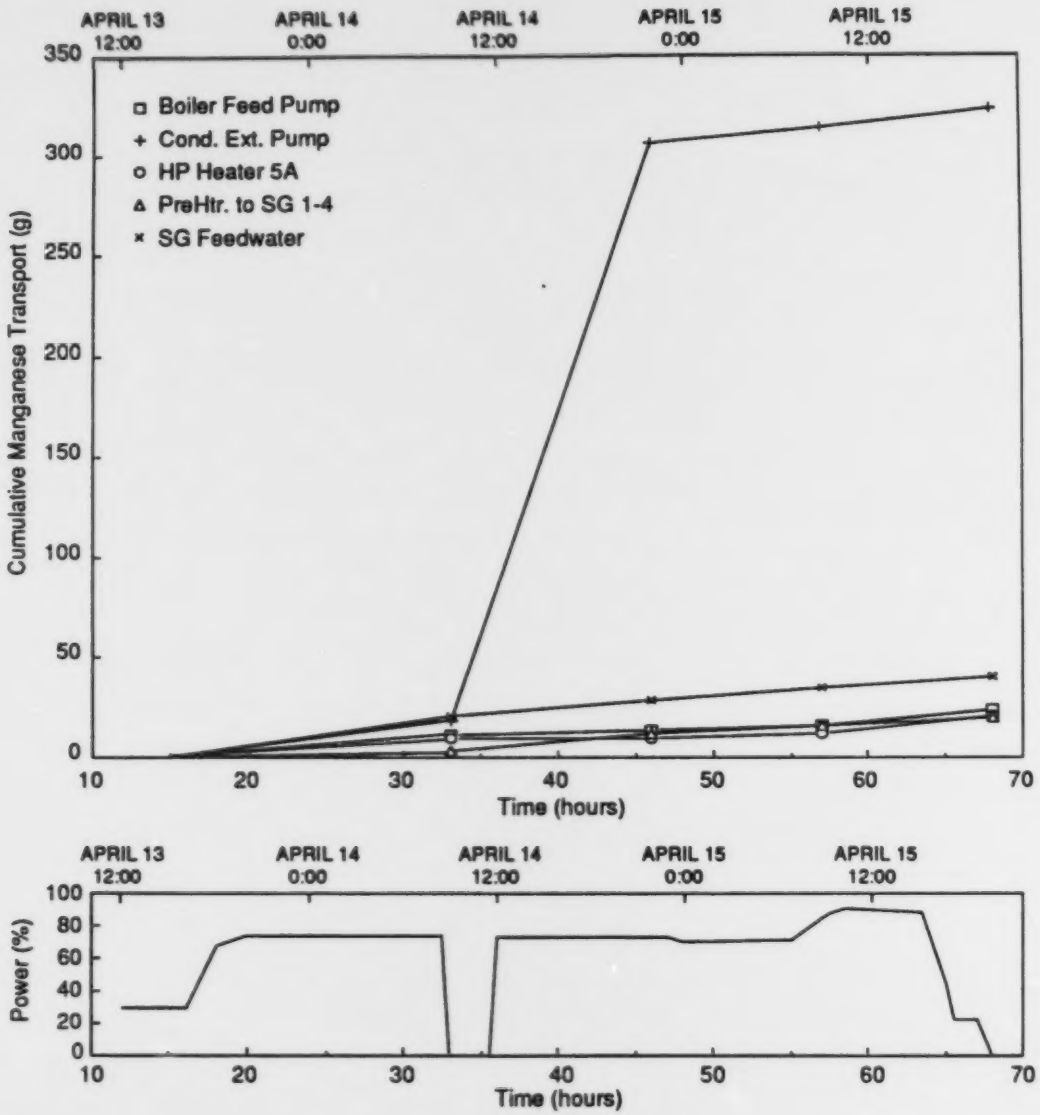


FIGURE 4.1.23

CUMULATIVE MANGANESE TRANSPORT
IN FEEDTRAIN OF BRUCE B-7
DURING APRIL 1988 SHUTDOWN

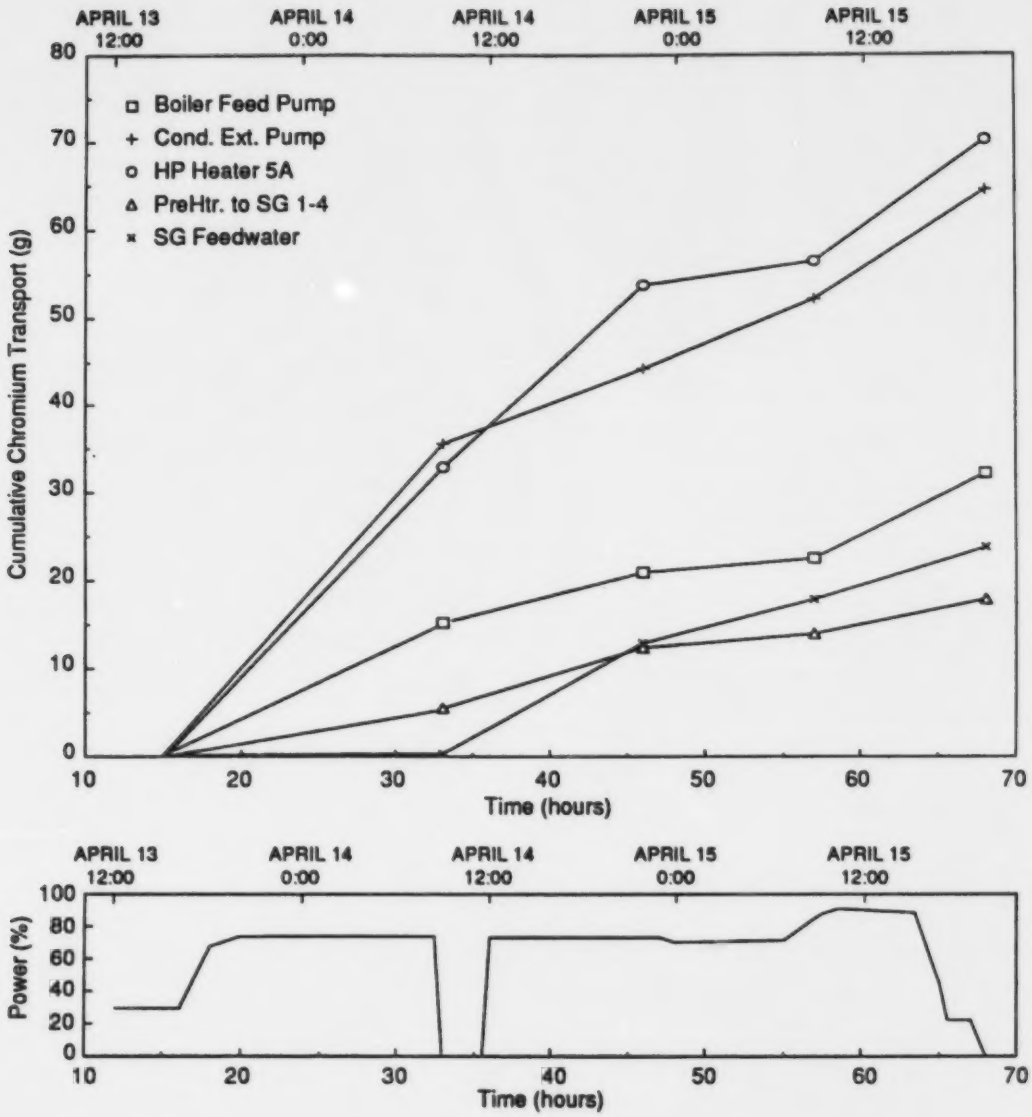


FIGURE 4.1.24

CUMULATIVE CHROMIUM TRANSPORT
IN FEEDTRAIN OF BRUCE B-7
DURING APRIL 1988 SHUTDOWN

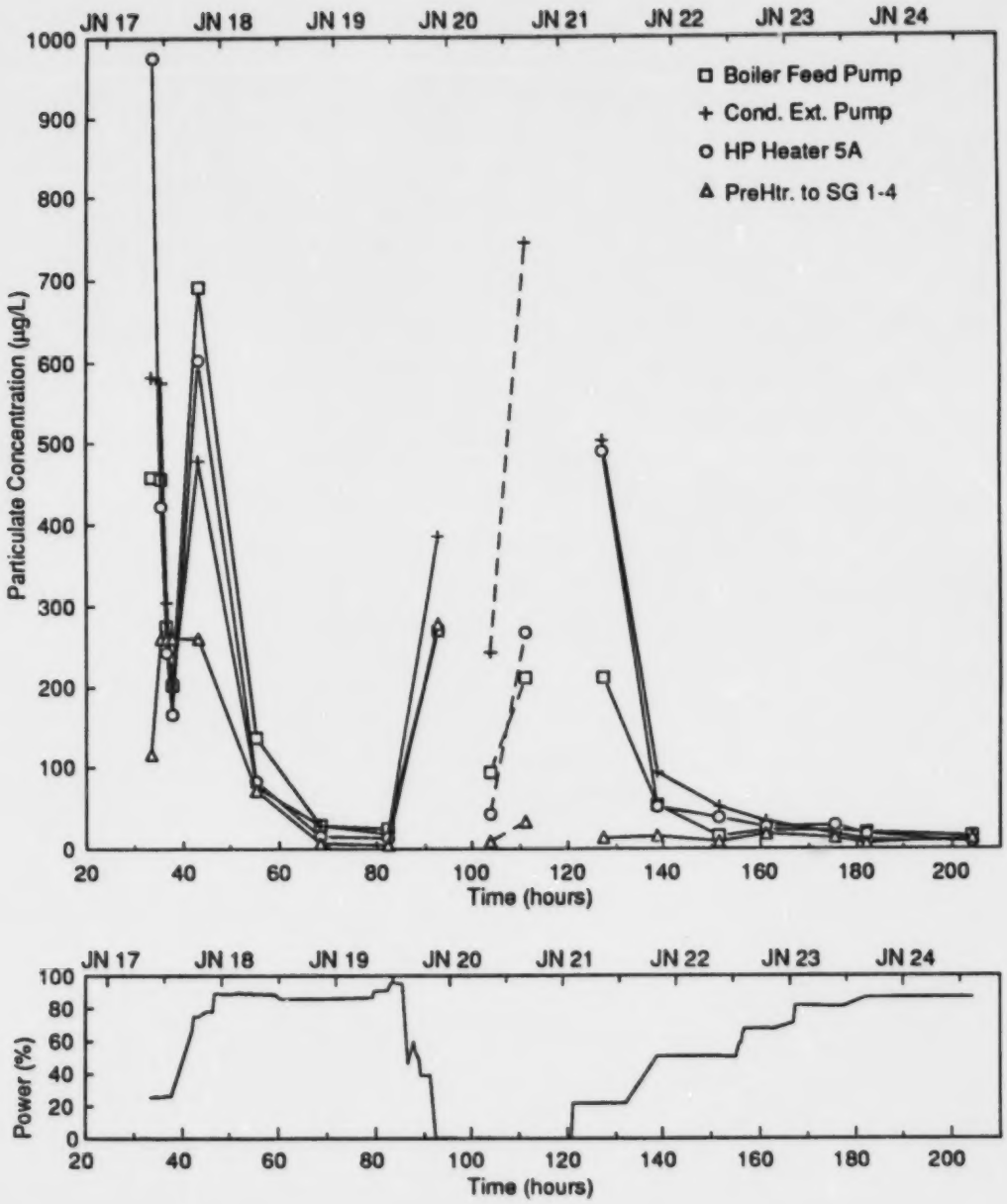


FIGURE 4.2.1

CONCENTRATION PROFILE OF PARTICULATE IN
FEEDWATER OF BRUCE B-7
DURING JUNE 1988 STARTUP

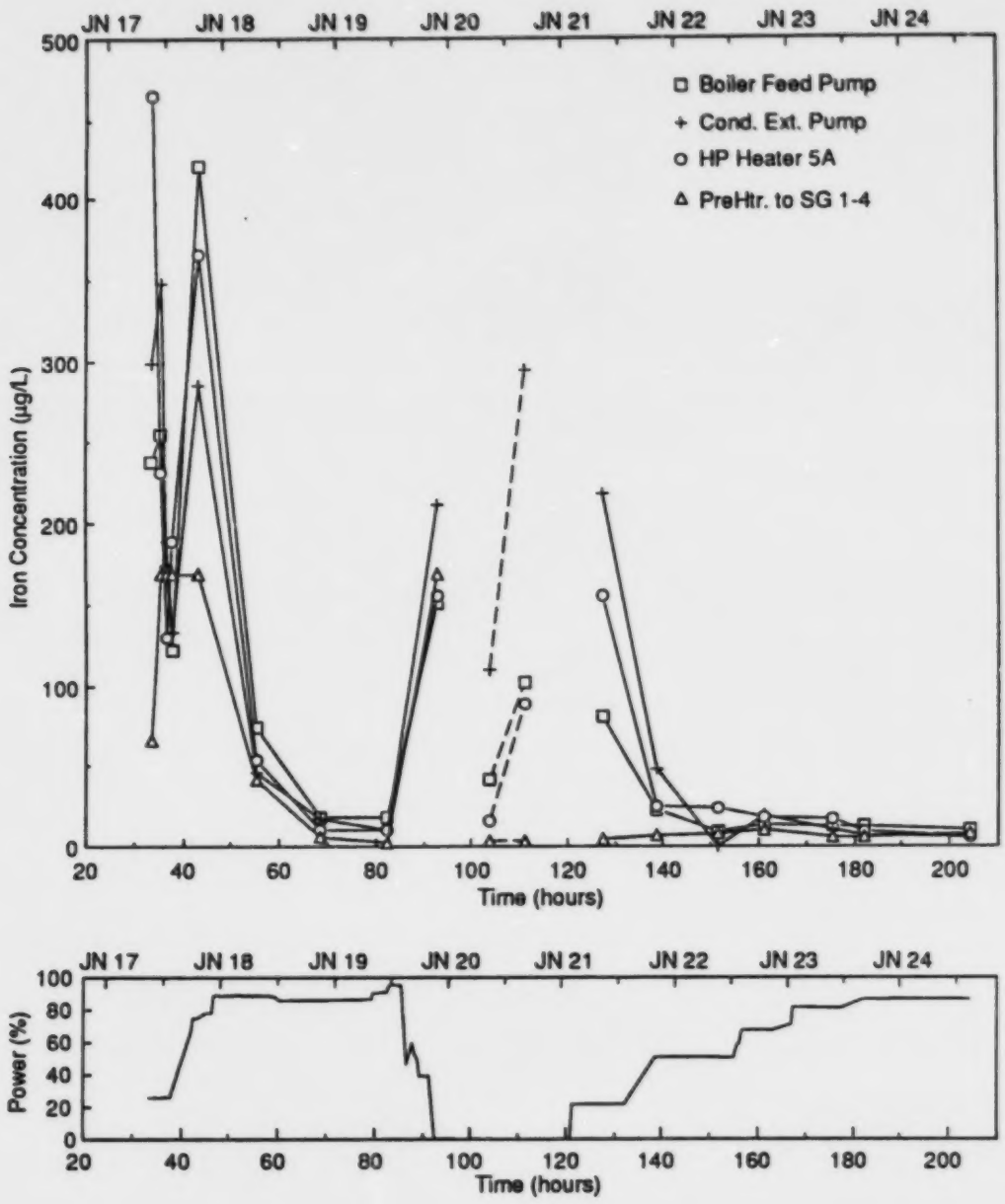


FIGURE 4.2.2

CONCENTRATION PROFILE OF IRON IN
FEEDWATER OF BRUCE B-7
DURING JUNE 1988 STARTUP

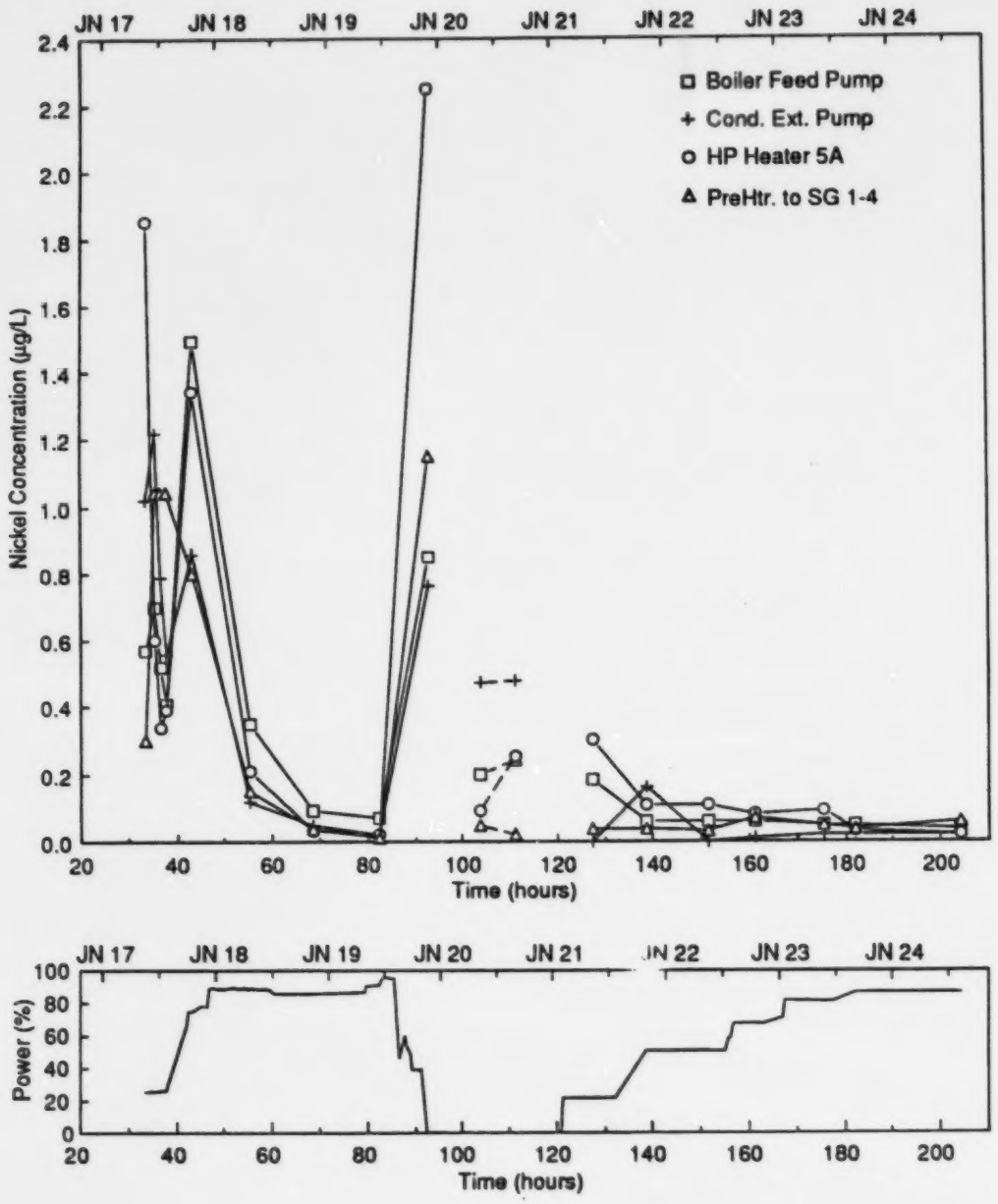


FIGURE 4.2.3

CONCENTRATION PROFILE OF NICKEL IN
FEEDWATER OF BRUCE B-7
DURING JUNE 1988 STARTUP

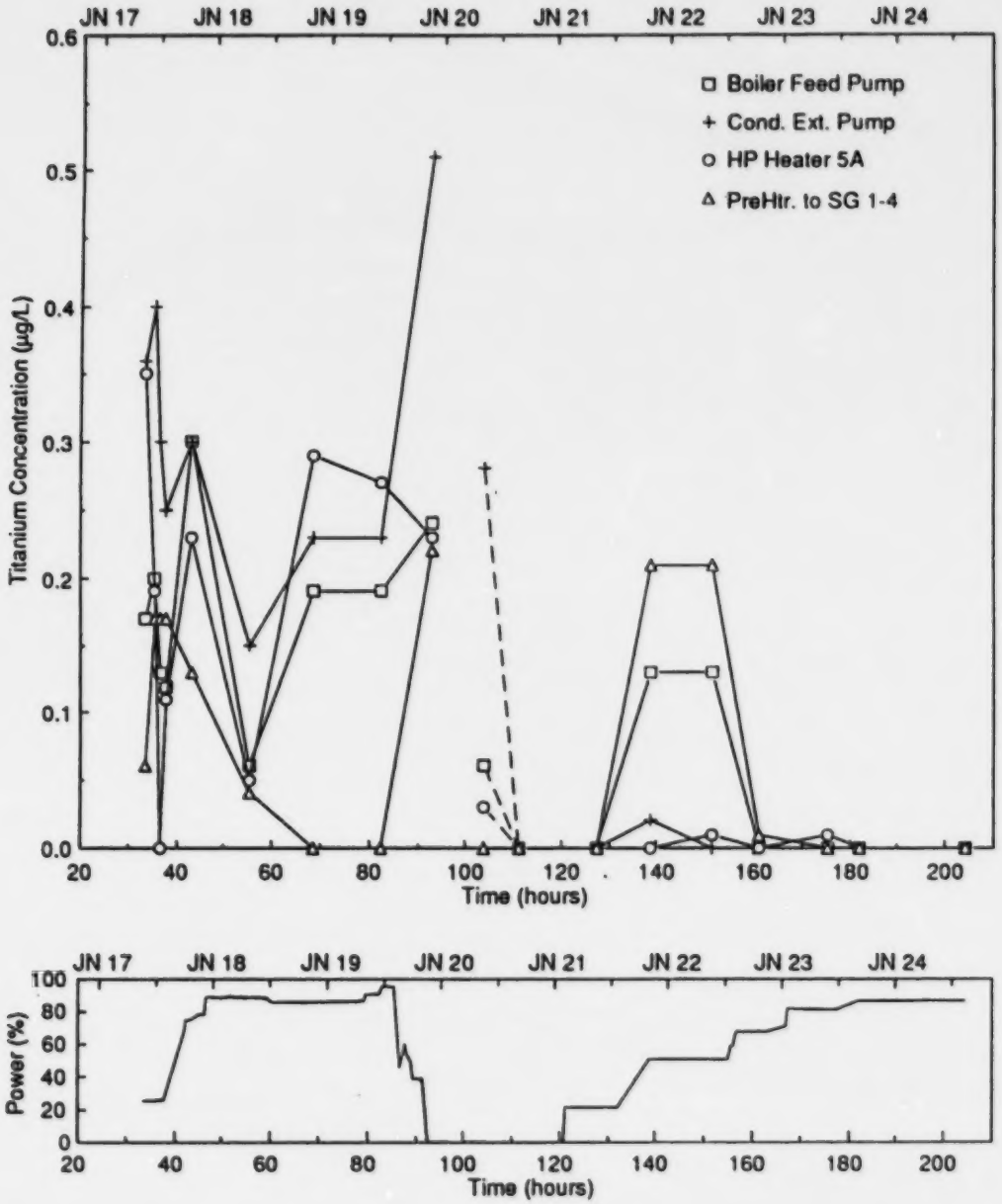


FIGURE 4.2.4

CONCENTRATION PROFILE OF TITANIUM IN
FEEDWATER OF BRUCE B-7
DURING JUNE 1988 STARTUP

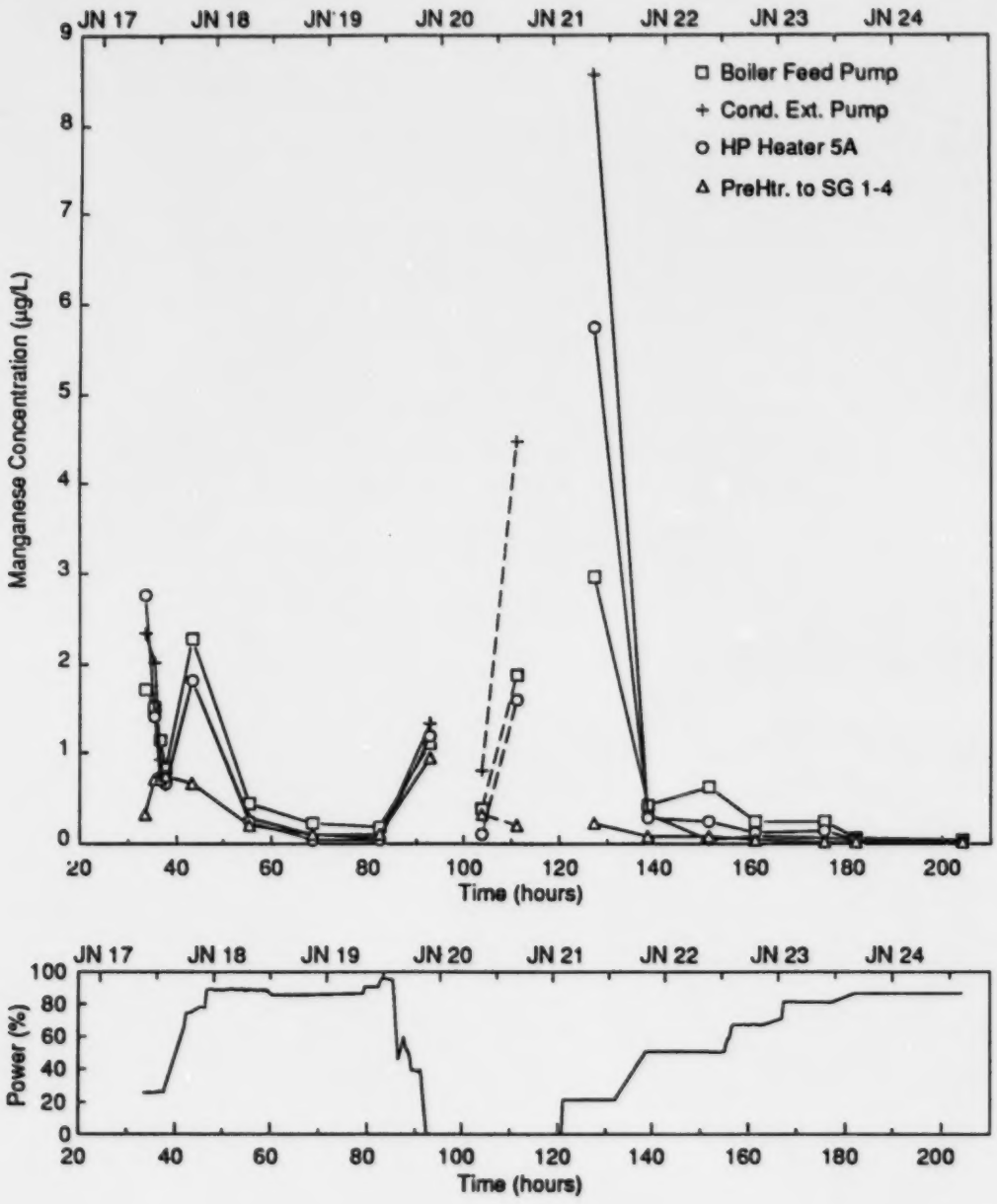


FIGURE 4.2.5

CONCENTRATION PROFILE OF MANGANESE IN
FEEDWATER OF BRUCE B-7
DURING JUNE 1988 STARTUP

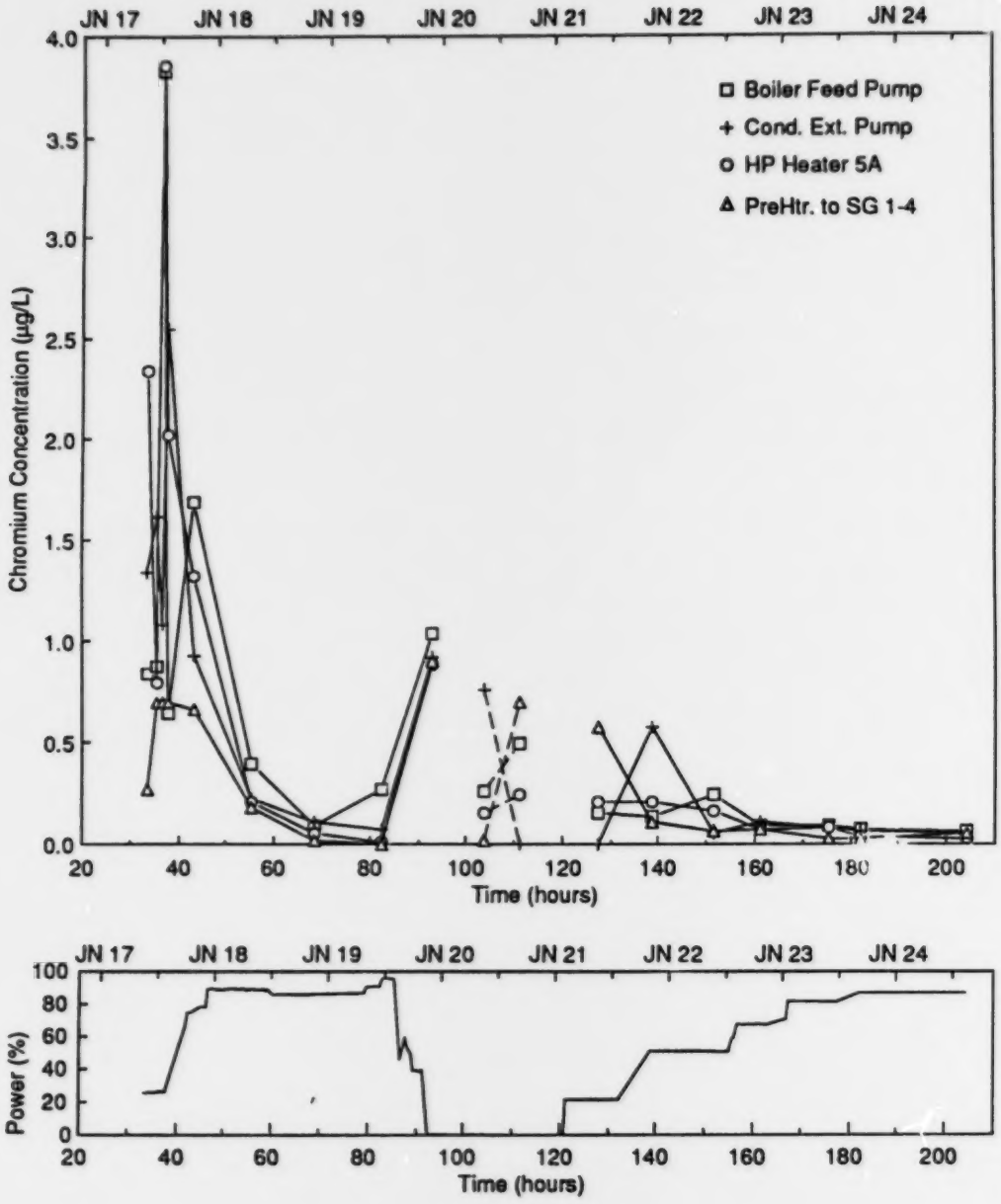


FIGURE 4.2.6

CONCENTRATION PROFILE OF CHROMIUM IN
FEEDWATER OF BRUCE B-7
DURING JUNE 1988 STARTUP

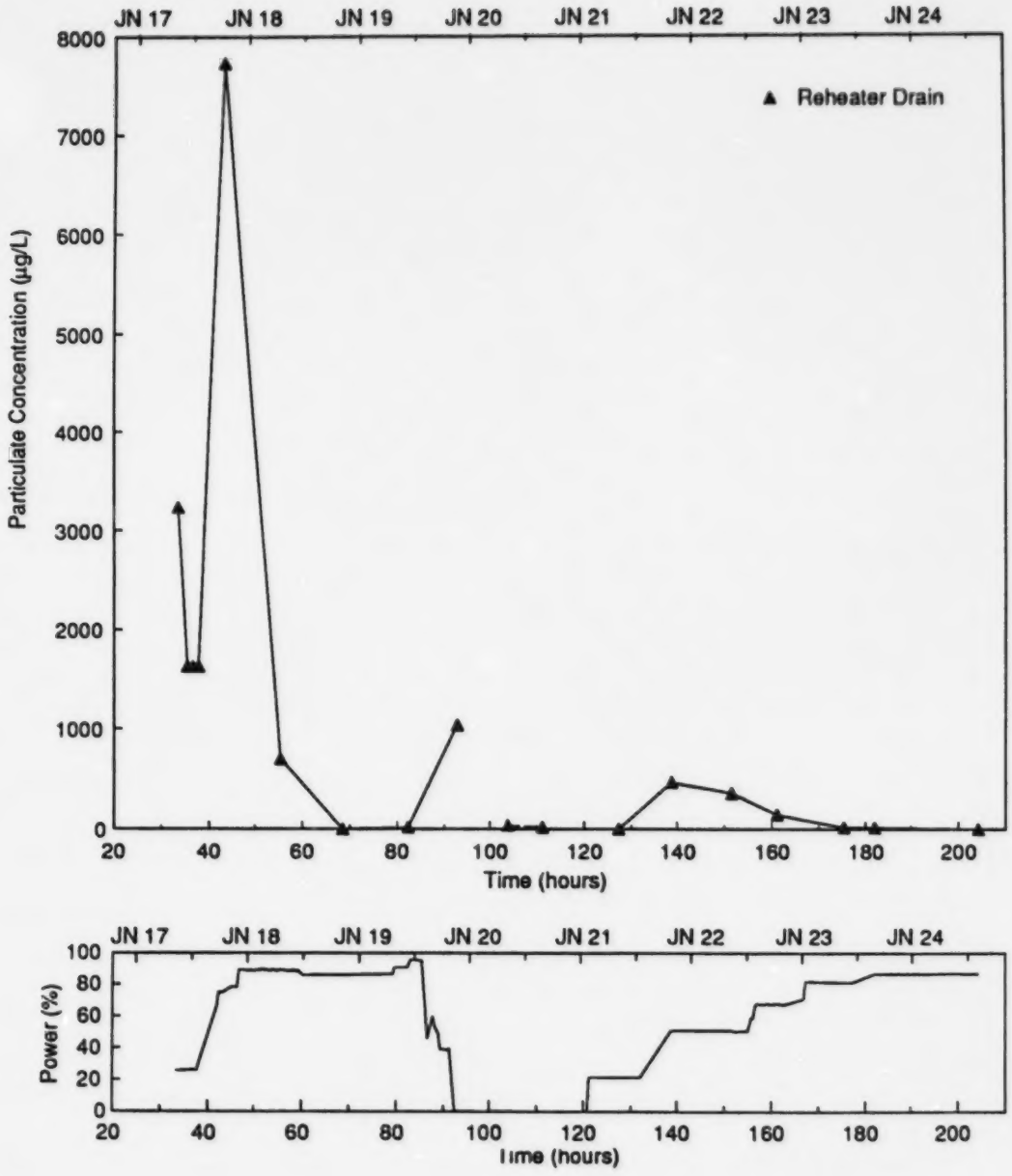


FIGURE 4.2.7

CONCENTRATION PROFILE OF PARTICULATE IN
DRAIN SYSTEM OF BRUCE B-7
DURING JUNE 1988 STARTUP

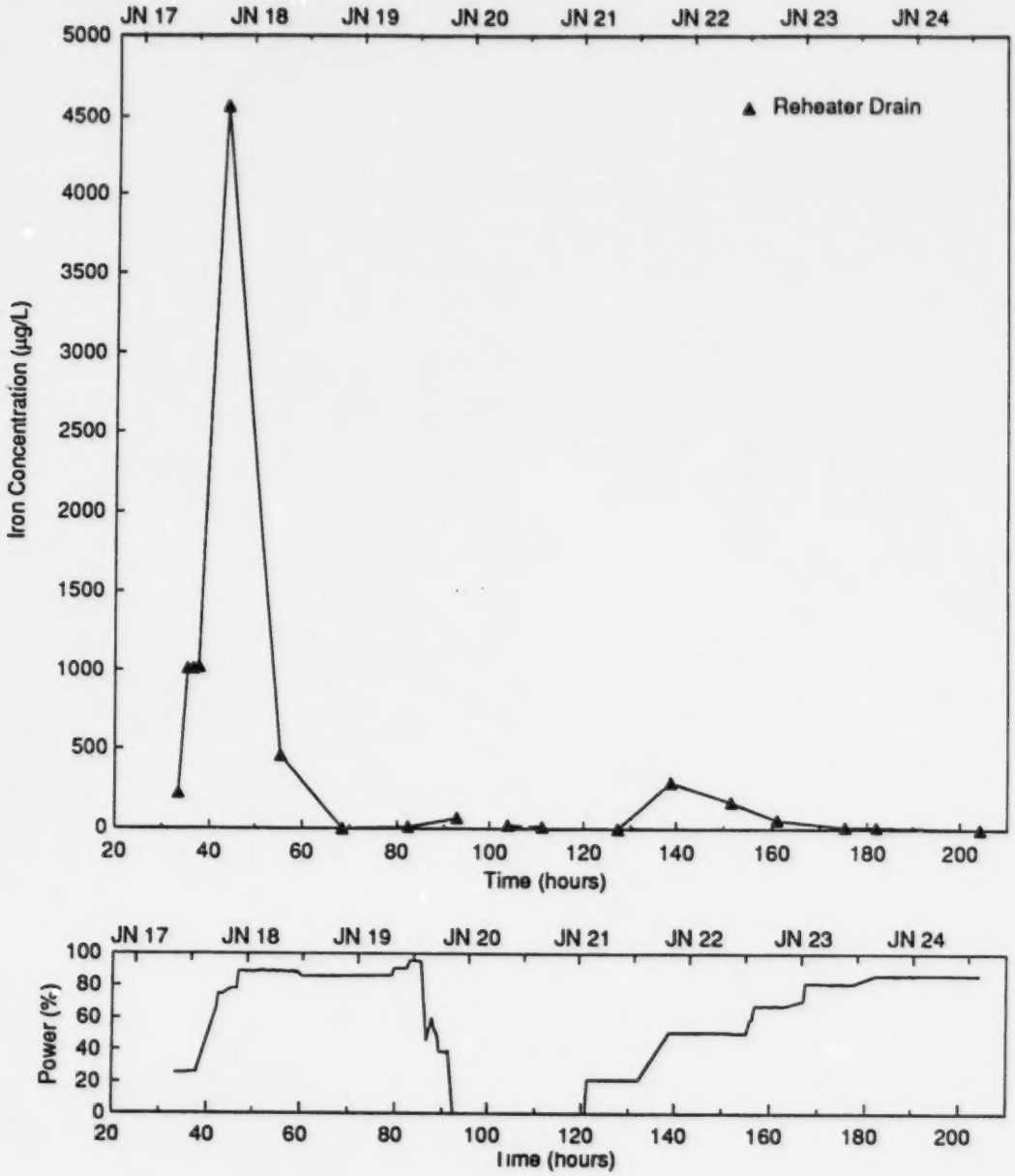


FIGURE 4.2.8

CONCENTRATION PROFILE OF IRON IN
DRAIN SYSTEM OF BRUCE B-7
DURING JUNE 1988 STARTUP

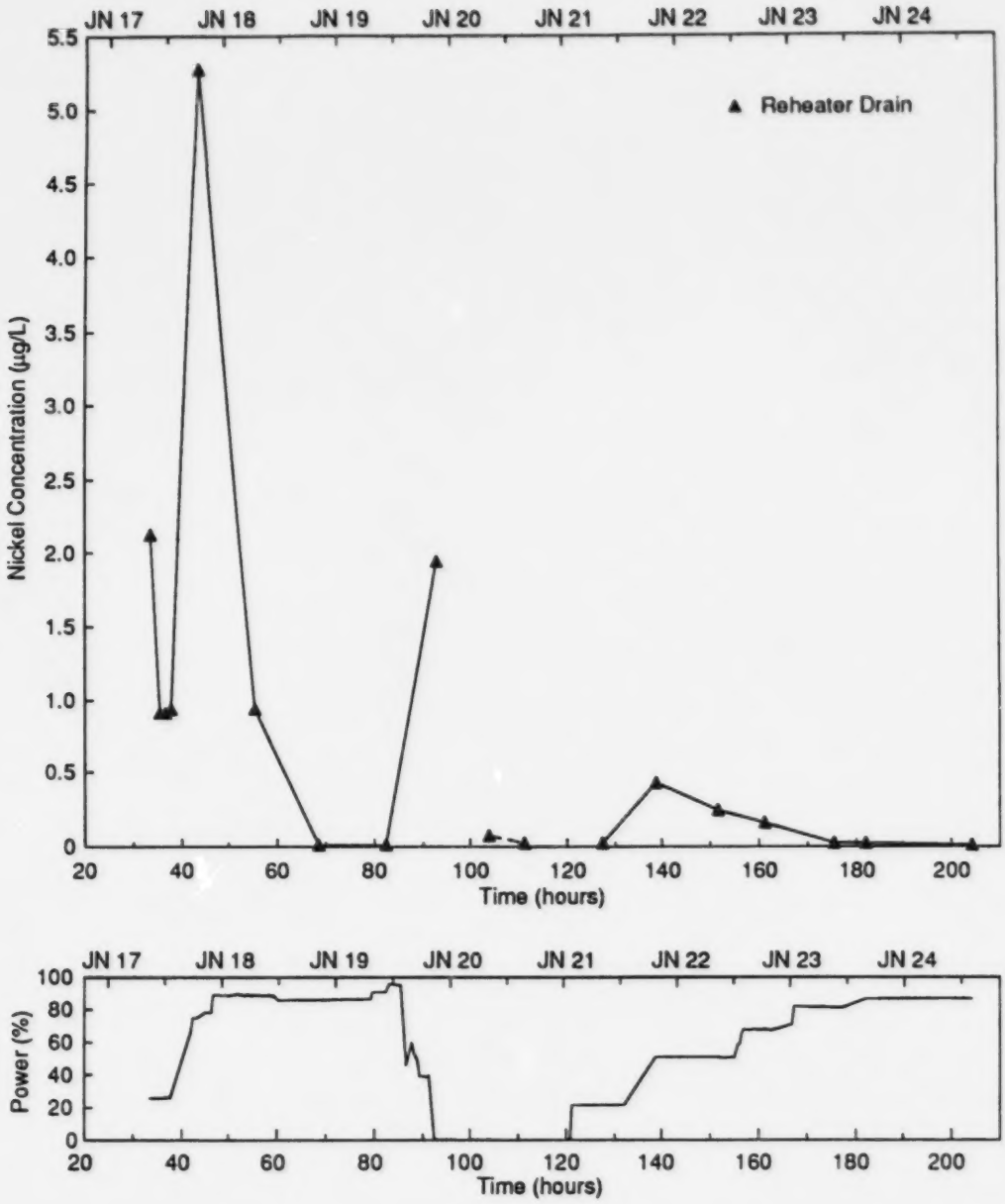


FIGURE 4.2.9

CONCENTRATION PROFILE OF NICKEL IN
DRAIN SYSTEM OF BRUCE B-7
DURING JUNE 1988 STARTUP

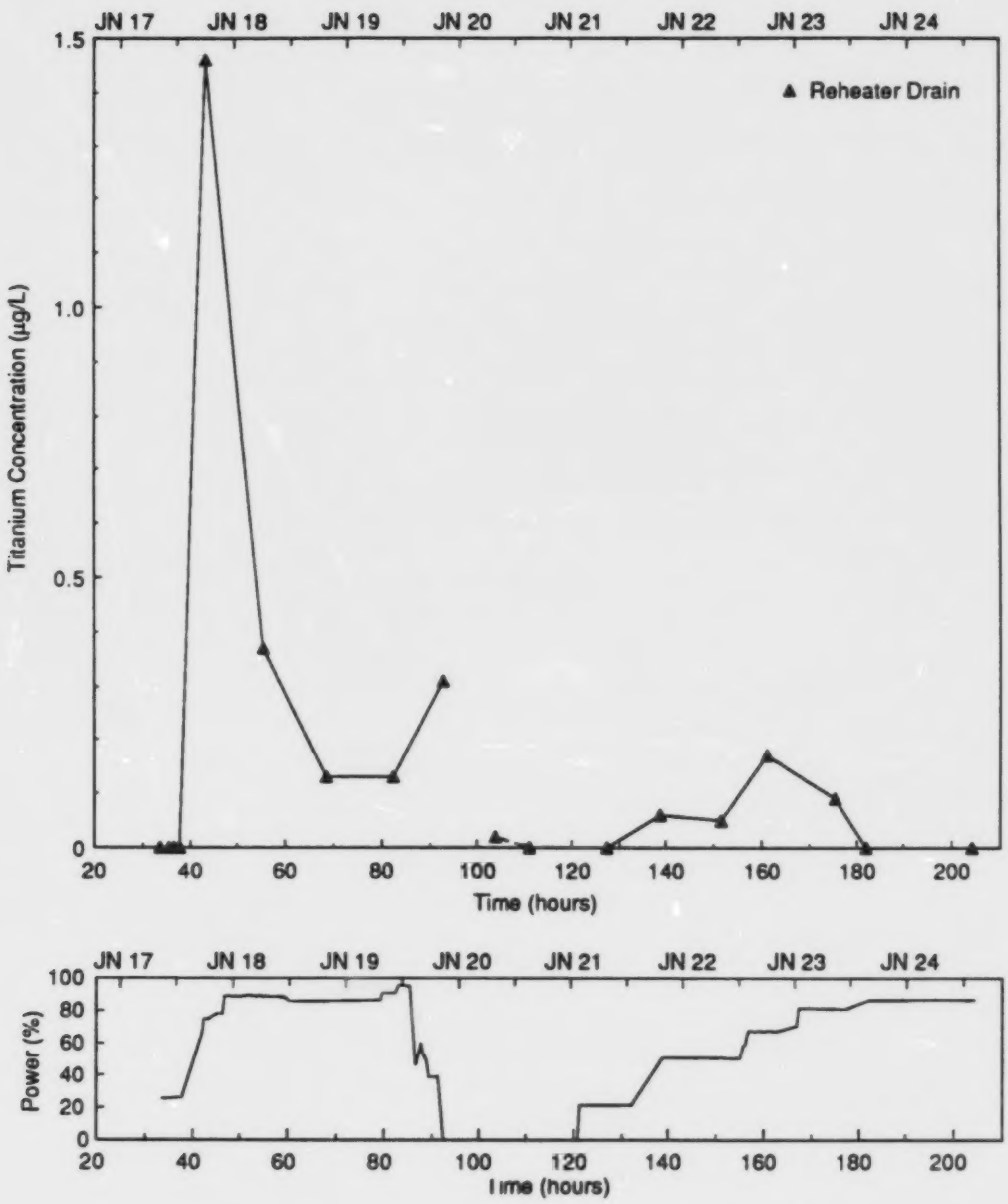


FIGURE 4.2.10

CONCENTRATION PROFILE OF TITANIUM IN
DRAIN SYSTEM OF BRUCE B-7
DURING JUNE 1988 STARTUP

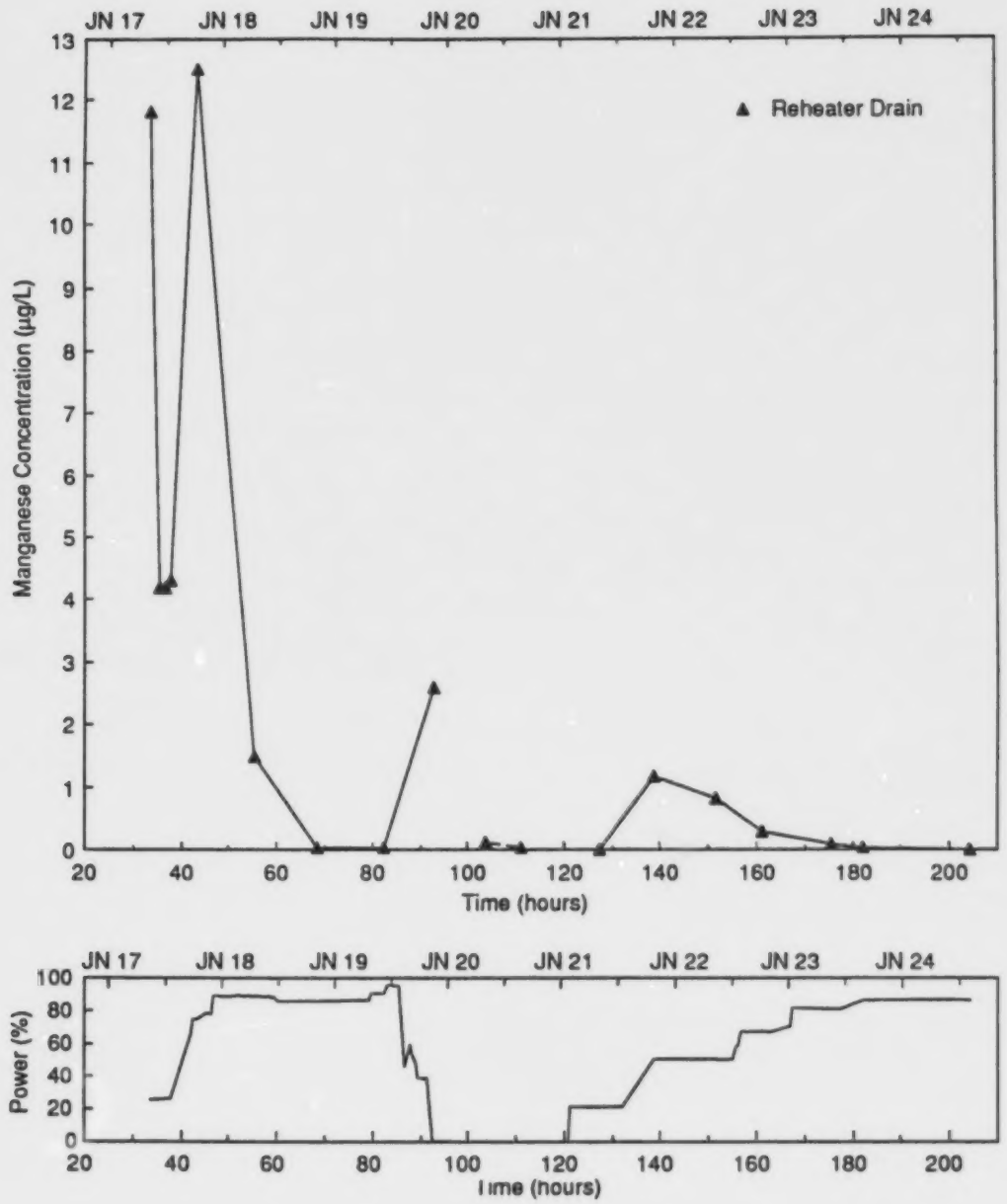


FIGURE 4.2.11

CONCENTRATION PROFILE OF MANGANESE IN
DRAIN SYSTEM OF BRUCE B-7
DURING JUNE 1988 STARTUP

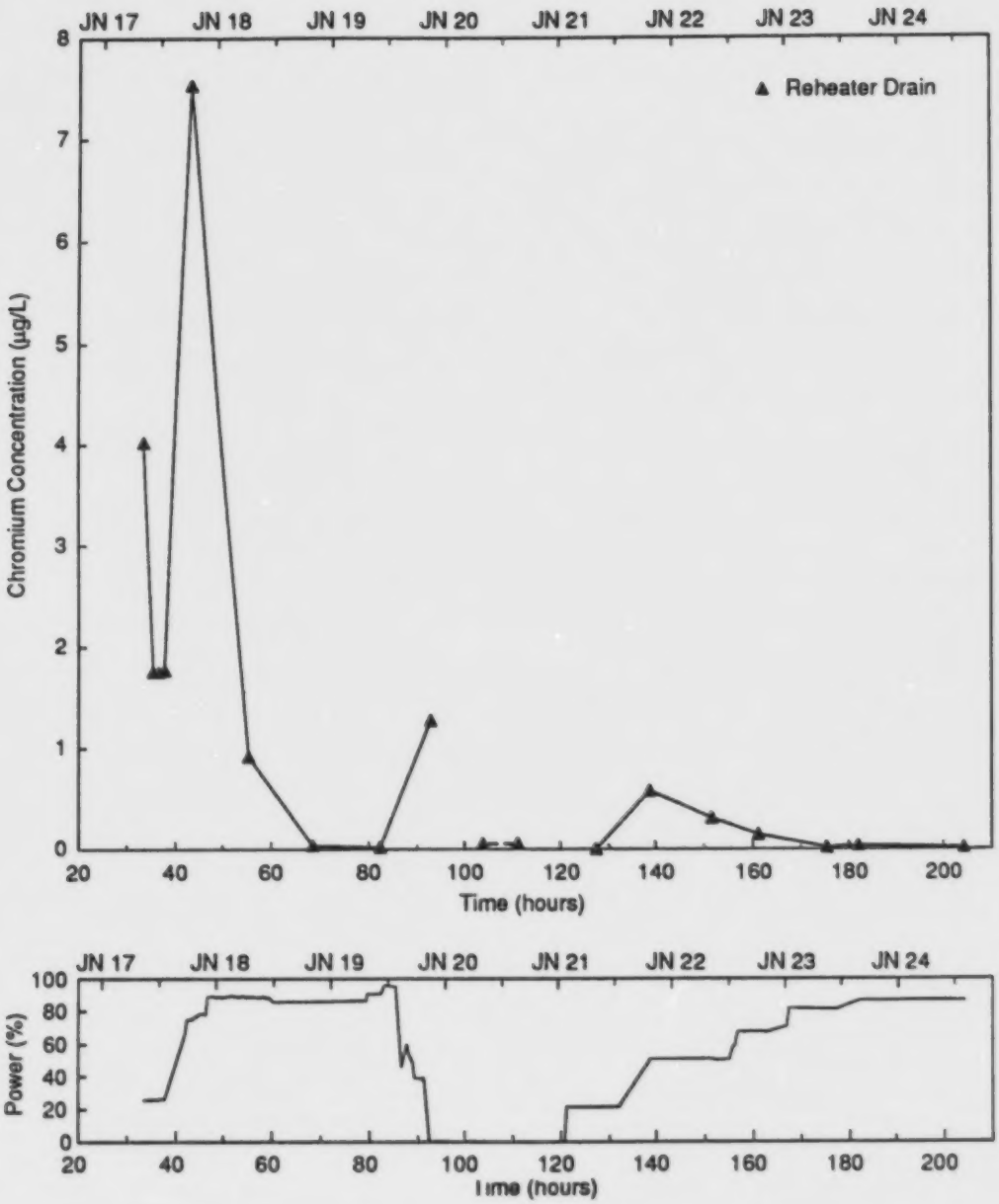


FIGURE 4.2.12

CONCENTRATION PROFILE OF CHROMIUM IN
DRAIN SYSTEM OF BRUCE B-7
DURING JUNE 1988 STARTUP

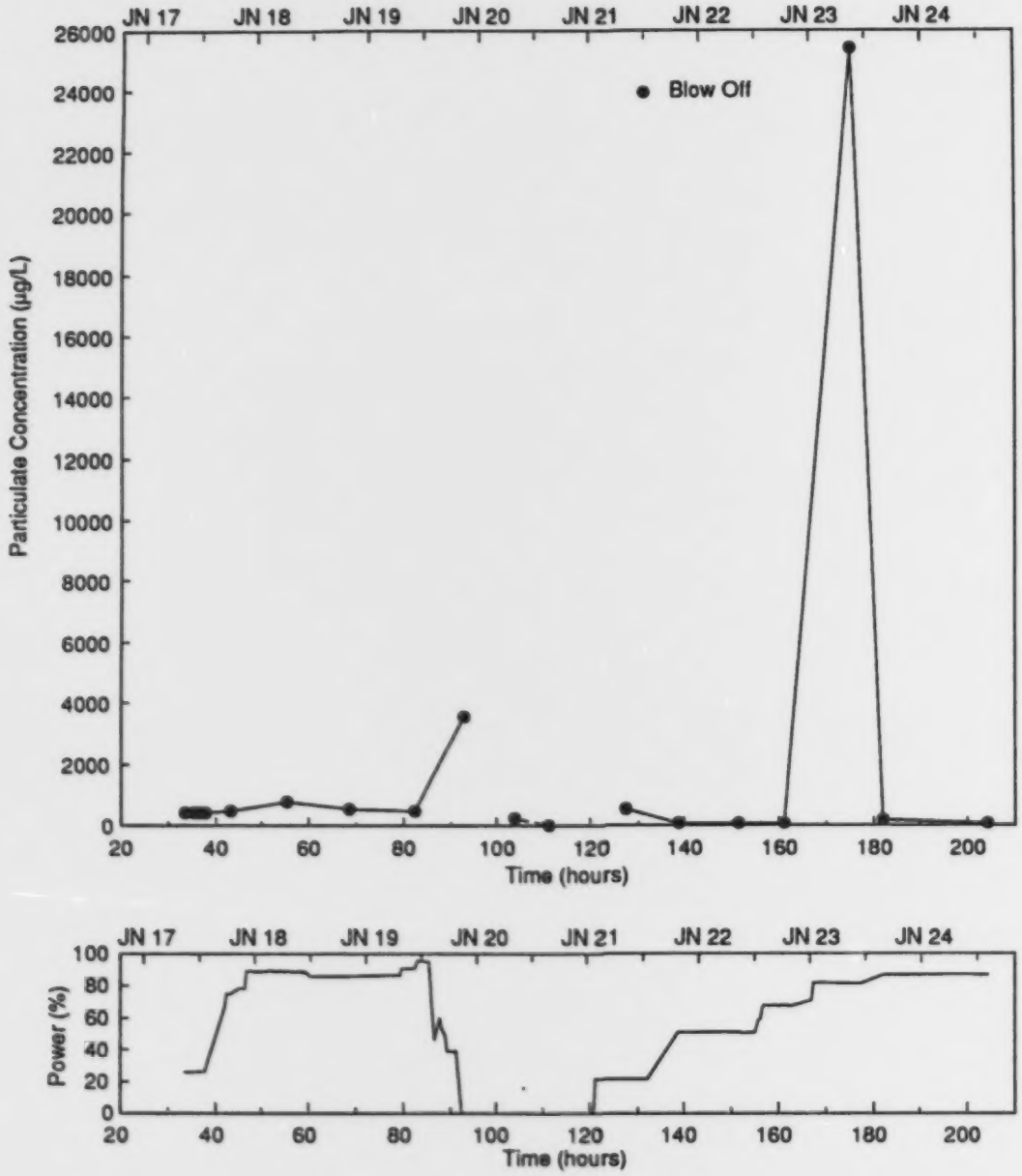


FIGURE 4.2.13

CONCENTRATION PROFILE OF PARTICULATE IN STEAM GENERATOR BLOWOFF OF BRUCE B-7 DURING JUNE 1988 STARTUP

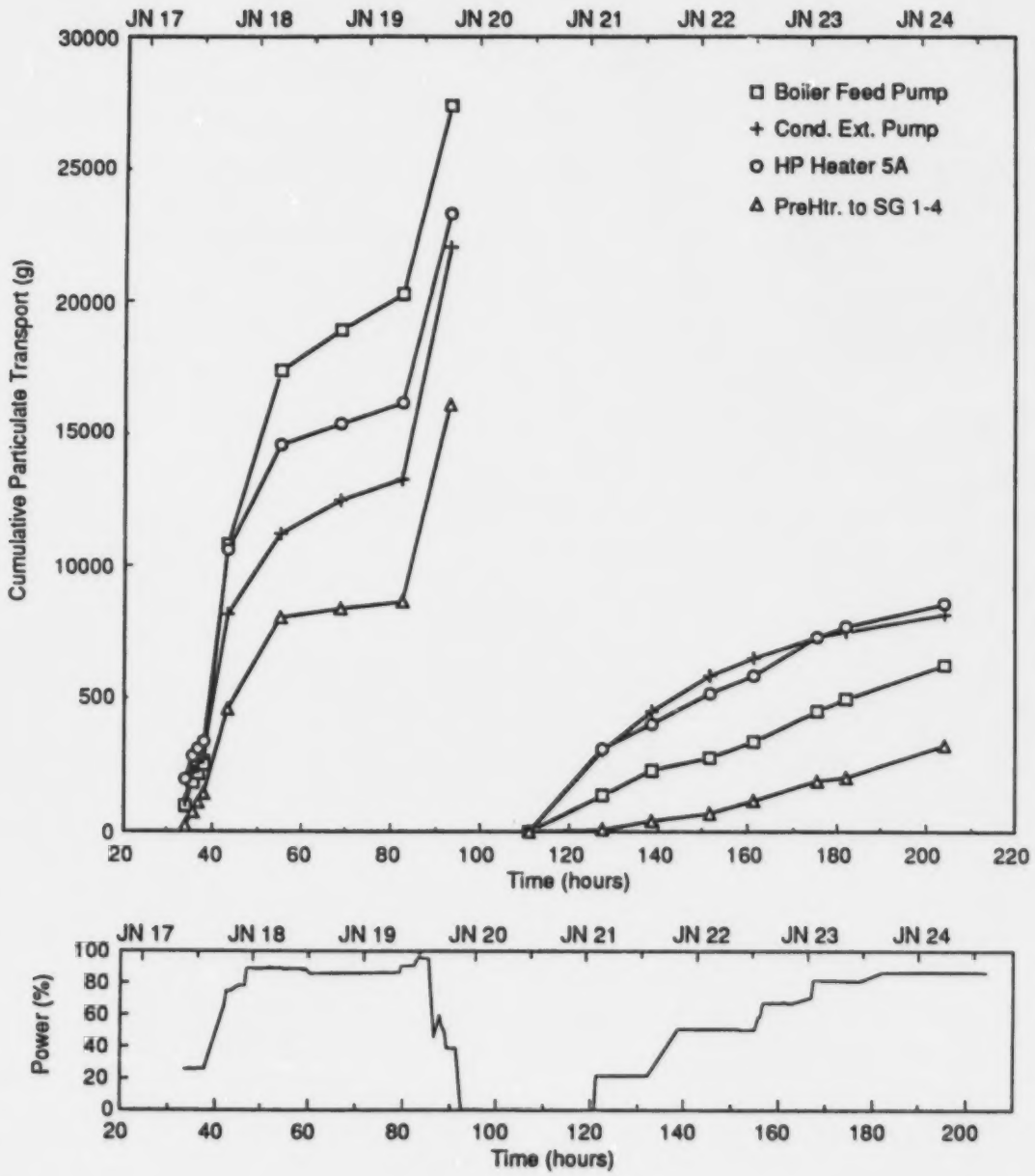


FIGURE 4.2.14

CUMULATIVE PARTICULATE TRANSPORT IN
FEEDTRAIN OF BRUCE B-7
DURING JUNE 1988 STARTUP

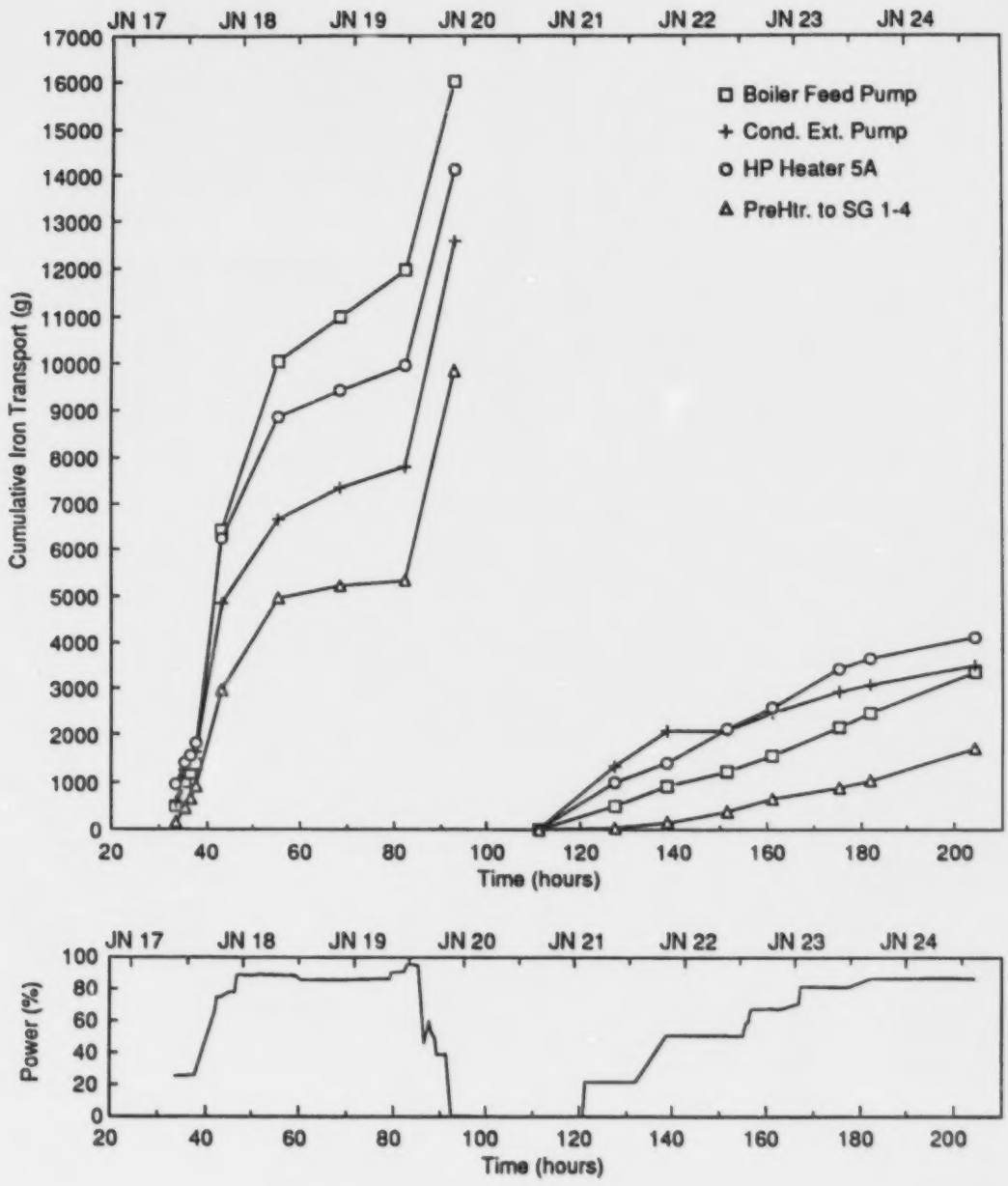


FIGURE 4.2.15

CUMULATIVE IRON TRANSPORT IN
FEEDTRAIN OF BRUCE B-7
DURING JUNE 1988 STARTUP

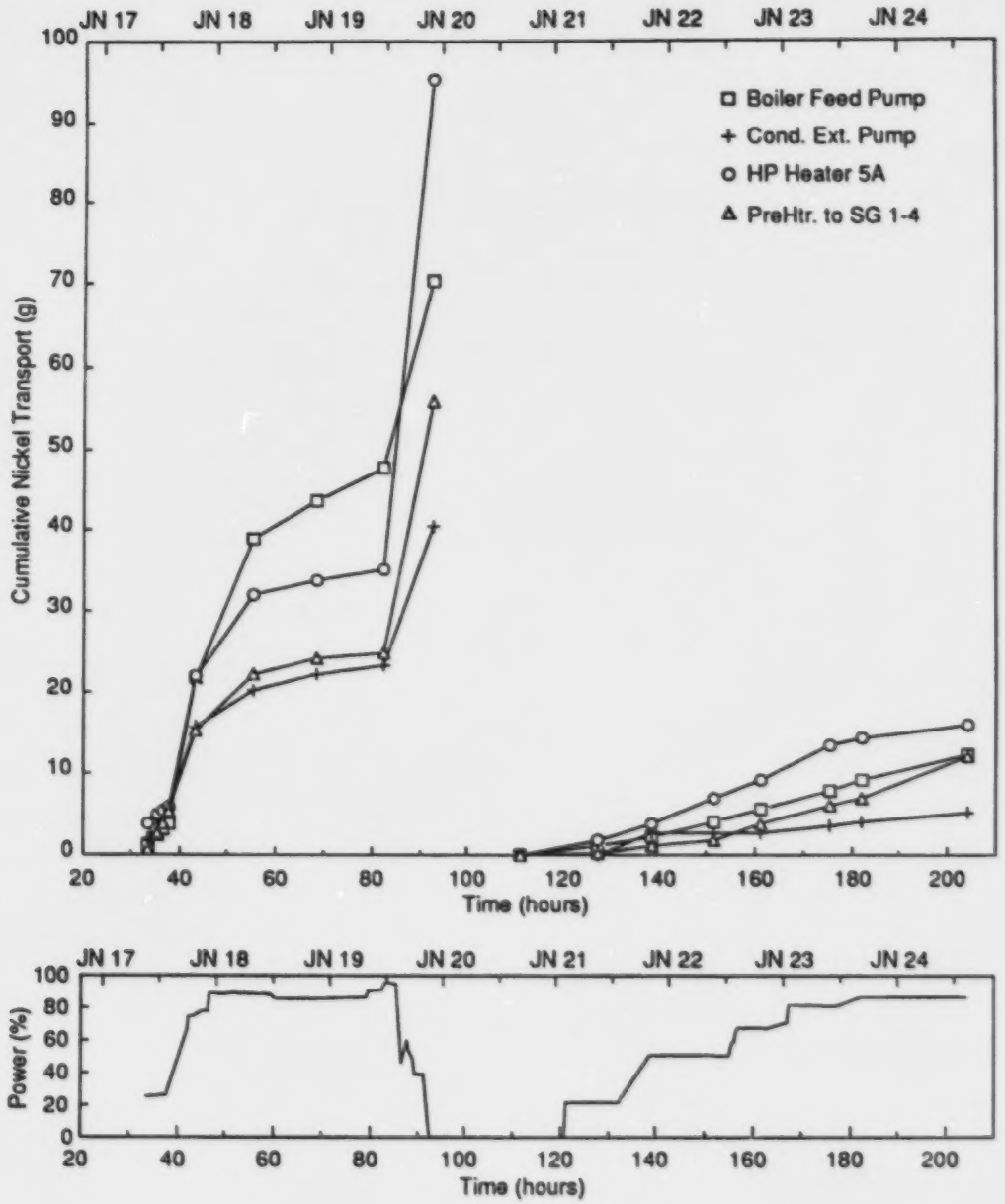


FIGURE 4.2.16

CUMULATIVE NICKEL TRANSPORT IN
FEEDTRAIN OF BRUCE B-7
DURING JUNE 1988 STARTUP

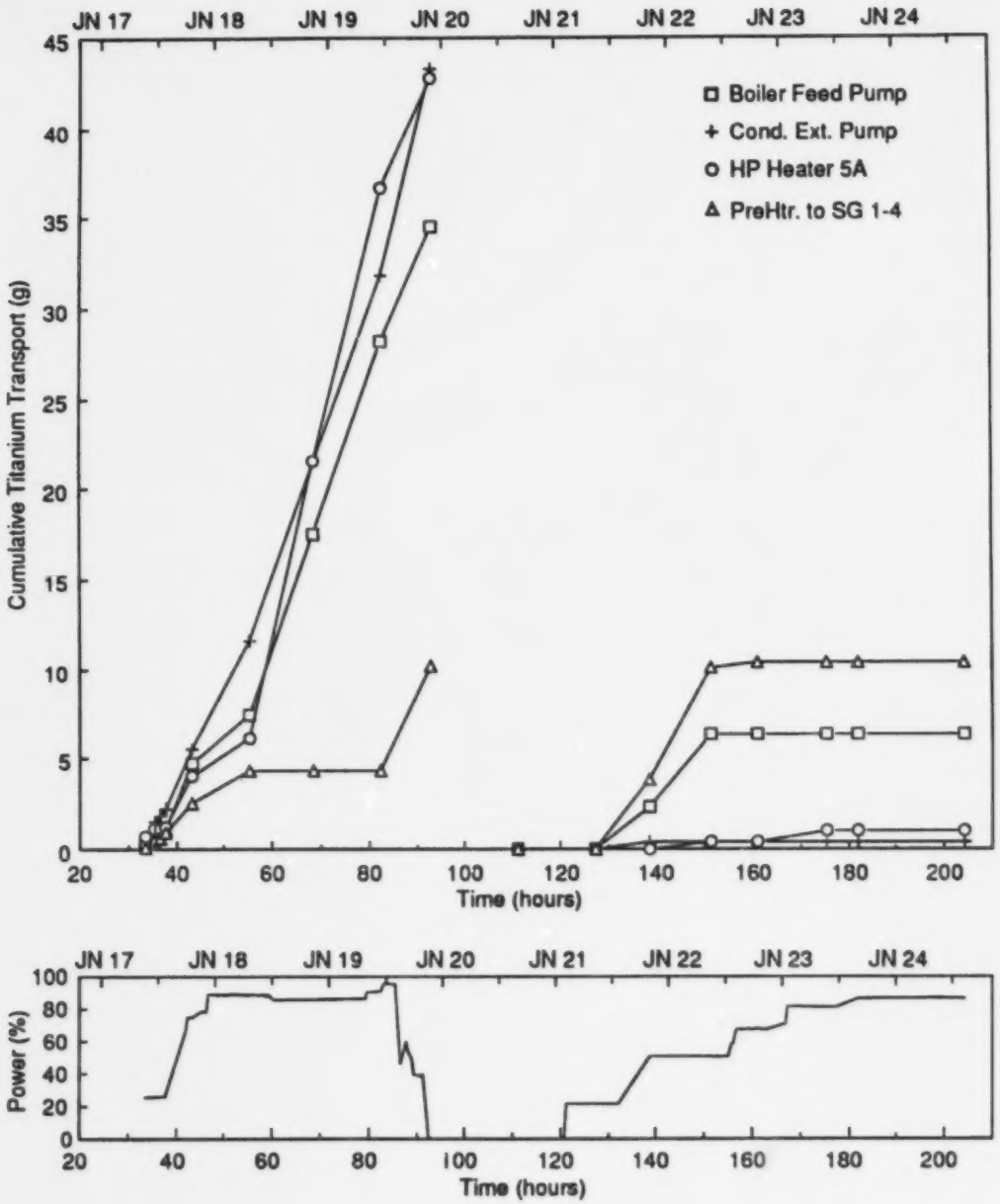


FIGURE 4.2.17

CUMULATIVE TITANIUM TRANSPORT IN
FEEDTRAIN OF BRUCE B-7
DURING JUNE 1988 STARTUP

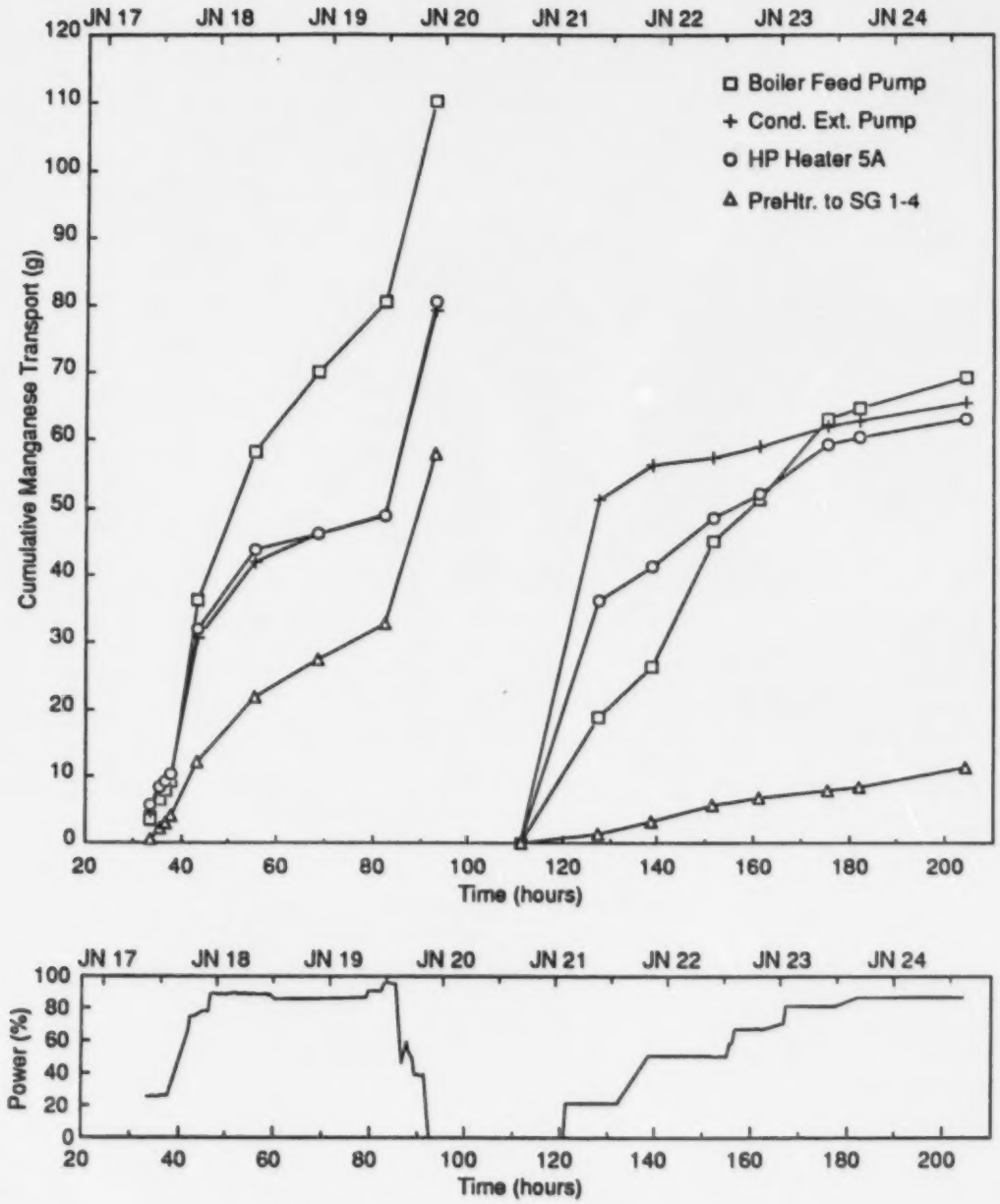


FIGURE 4.2.18

CUMULATIVE MANGANESE TRANSPORT IN
FEEDTRAIN OF BRUCE B-7
DURING JUNE 1988 STARTUP

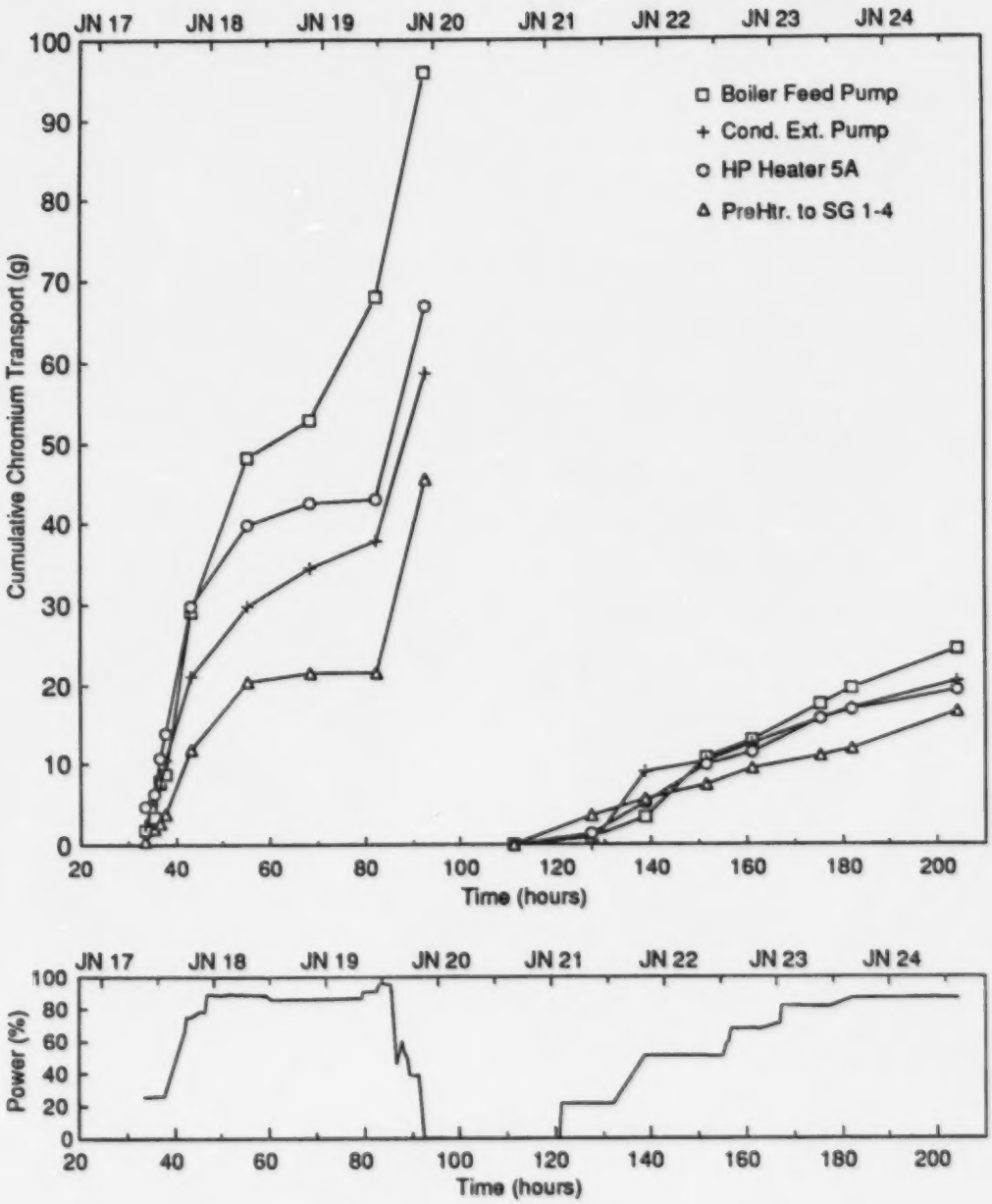


FIGURE 4.2.19

CUMULATIVE CHROMIUM TRANSPORT IN
FEEDTRAIN OF BRUCE B-7
DURING JUNE 1988 STARTUP

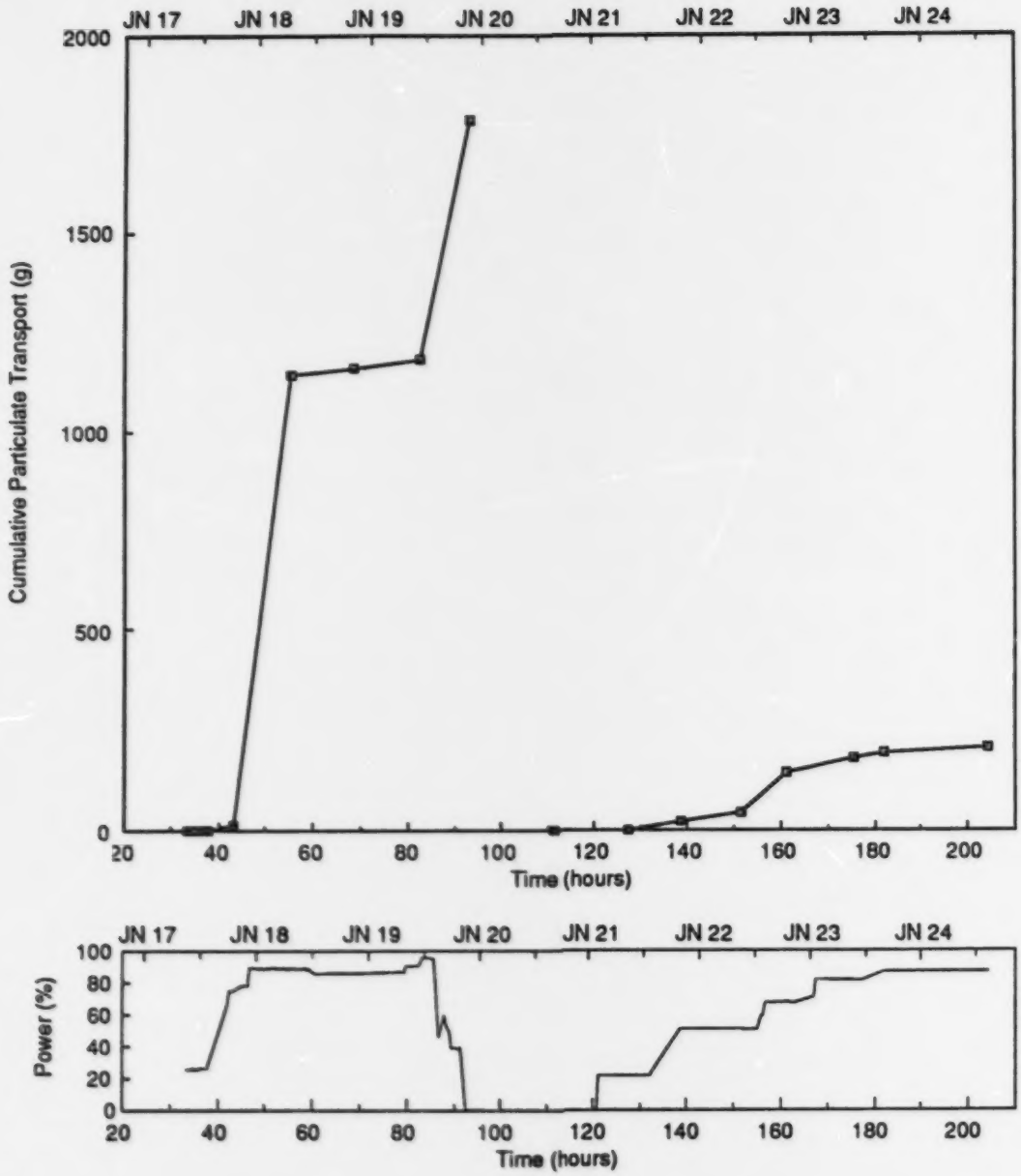


FIGURE 4.2.20

CUMULATIVE PARTICULATE TRANSPORT IN
REHEATER DRAINS OF BRUCE B-7
DURING JUNE 1988 STARTUP

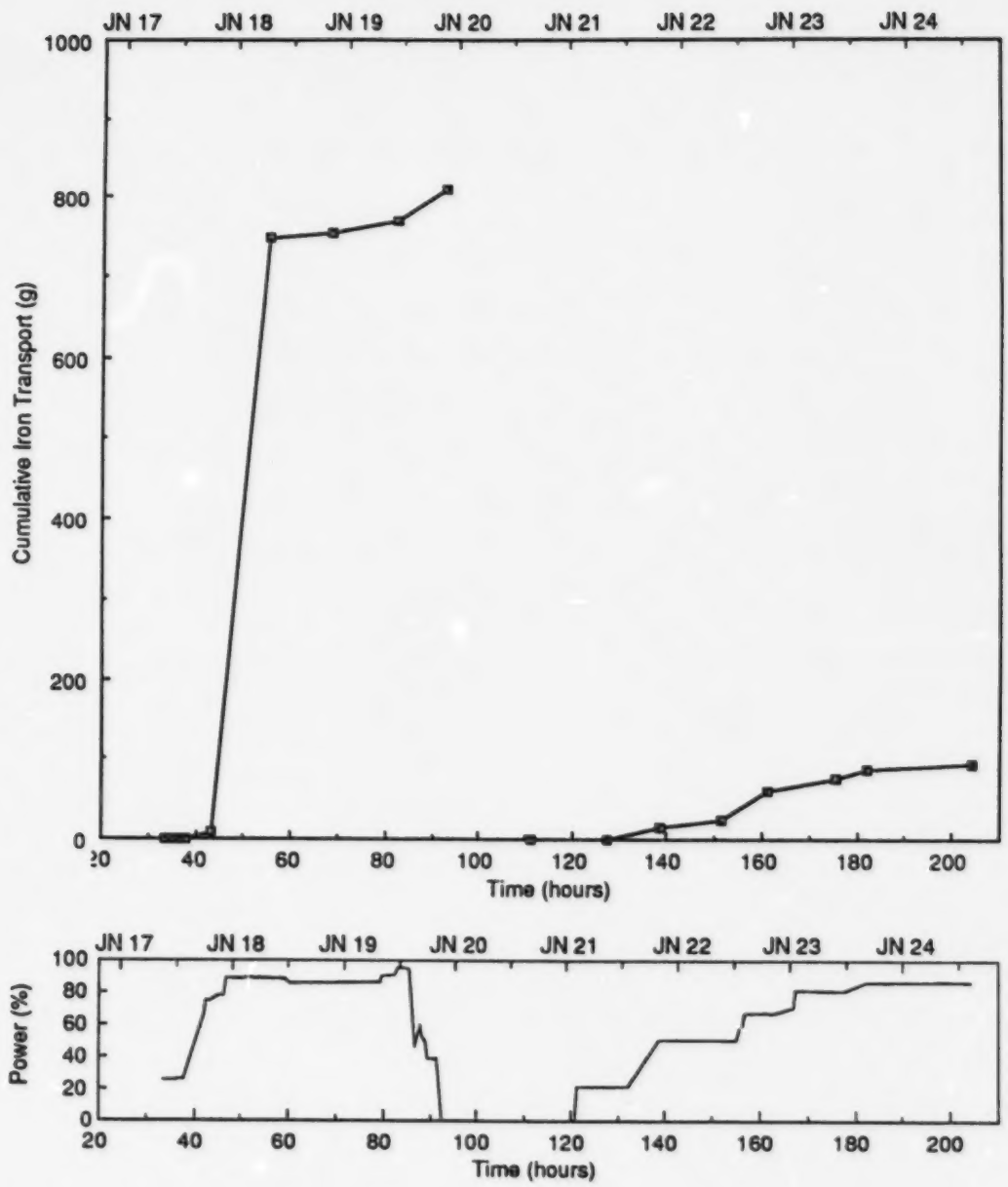


FIGURE 4.2.21

CUMULATIVE IRON TRANSPORT IN
REHEATER DRAINS OF BRUCE B-7
DURING JUNE 1988 STARTUP

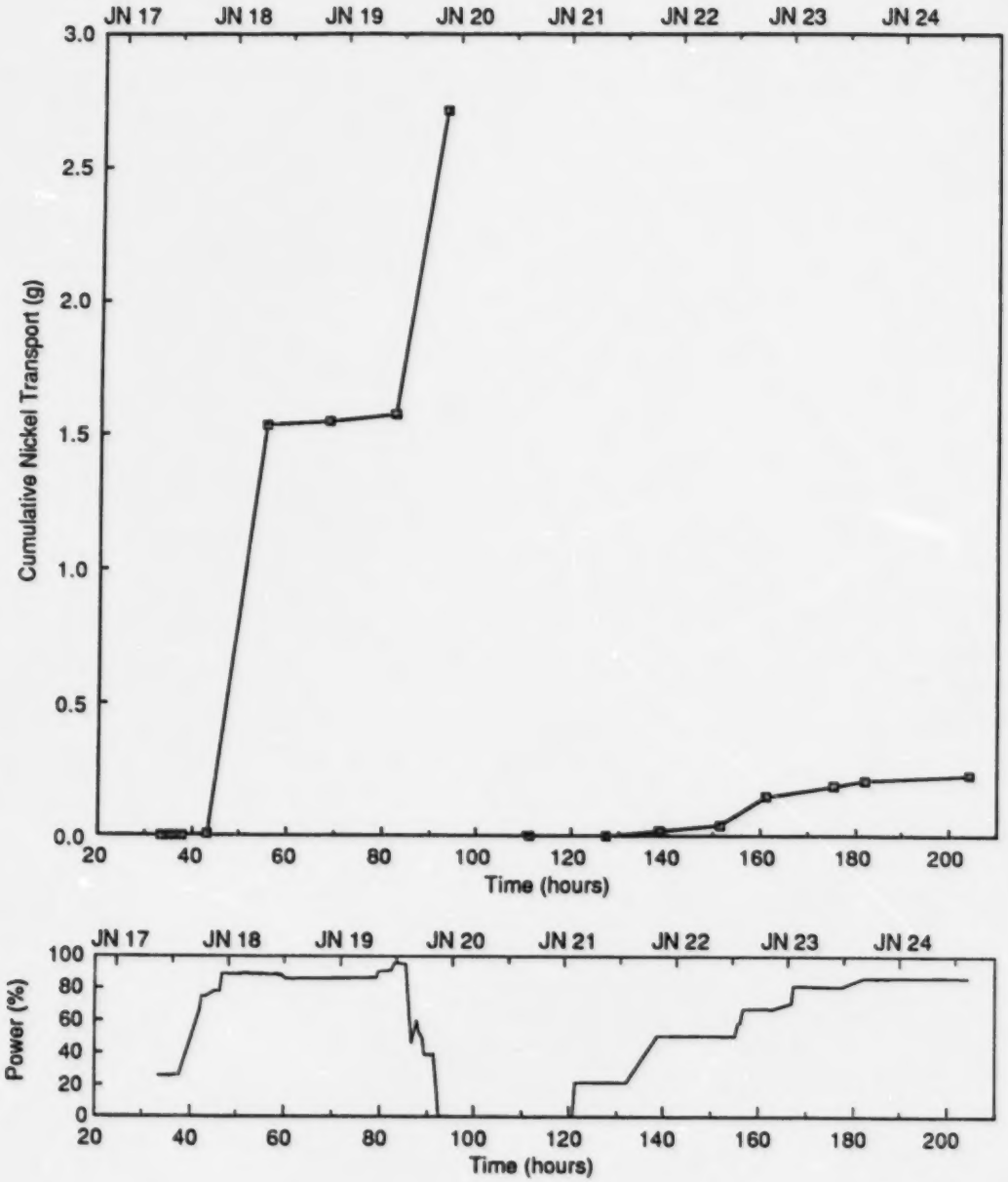


FIGURE 4.2.22

CUMULATIVE NICKEL TRANSPORT IN
REHEATER DRAINS OF BRUCE B-7
DURING JUNE 1988 STARTUP

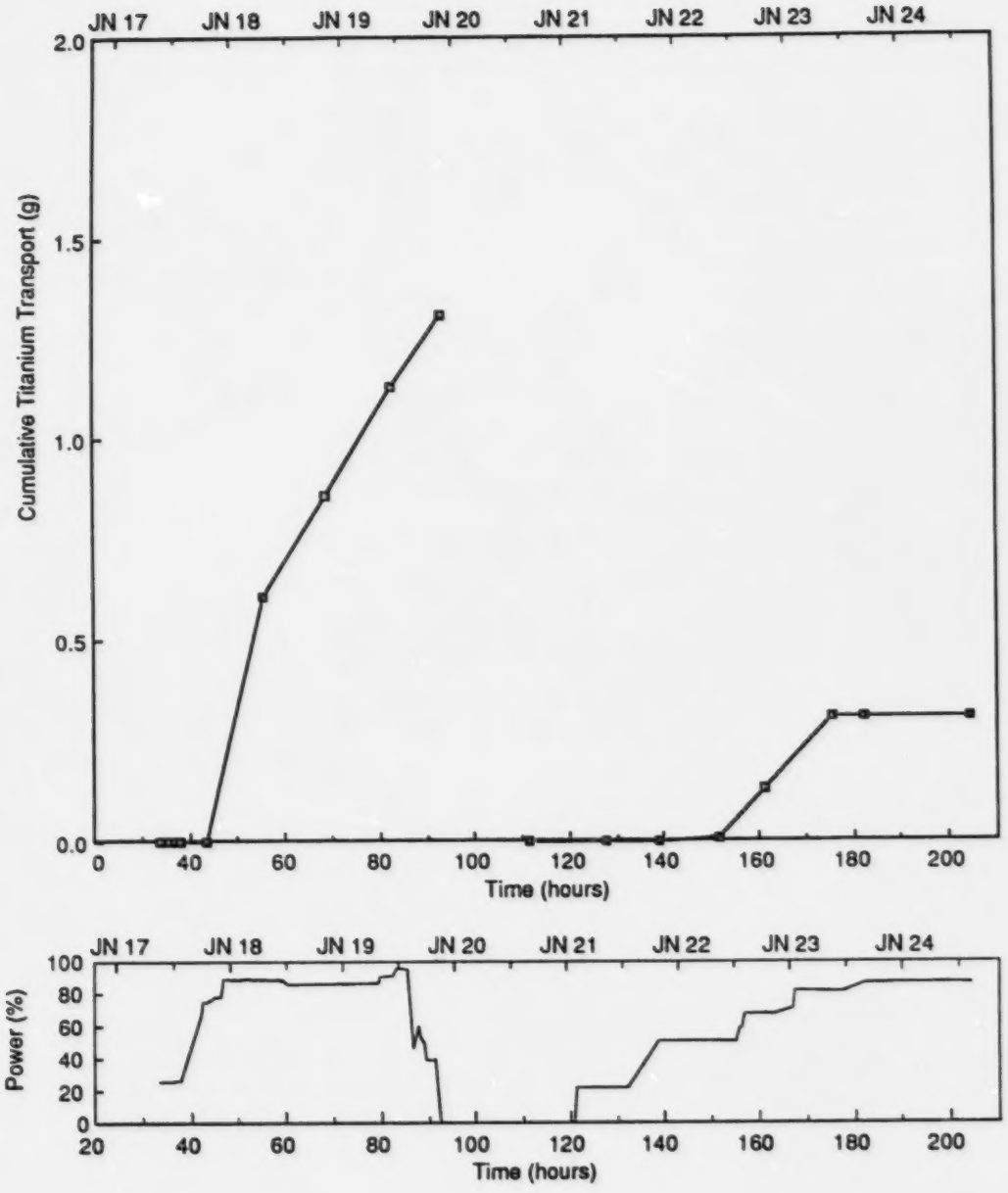


FIGURE 4.2.23

CUMULATIVE TITANIUM TRANSPORT IN
REHEATER DRAINS OF BRUCE B-7
DURING JUNE 1988 STARTUP

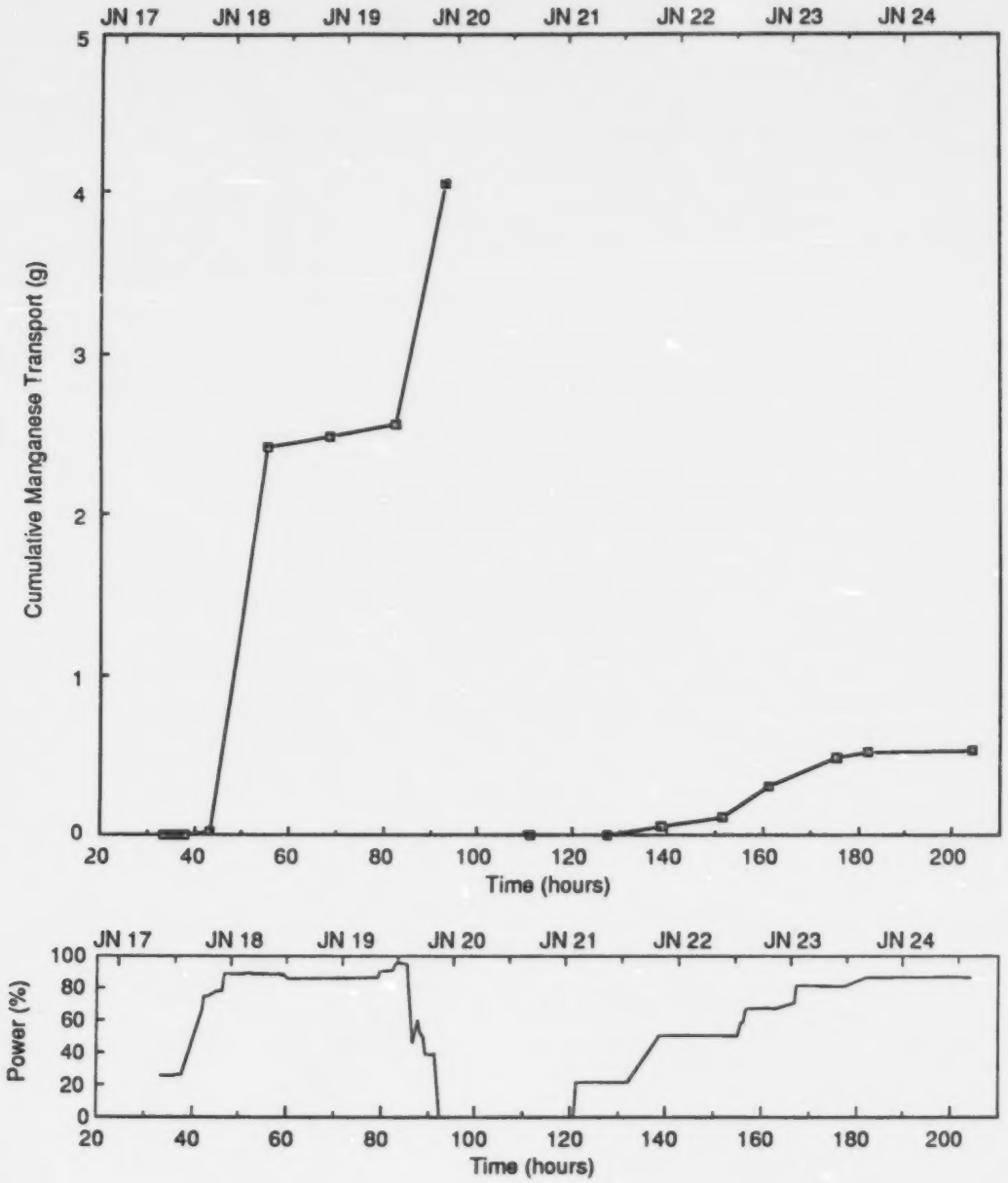


FIGURE 4.2.24

CUMULATIVE MANGANESE TRANSPORT IN
REHEATER DRAINS OF BRUCE B-7
DURING JUNE 1988 STARTUP

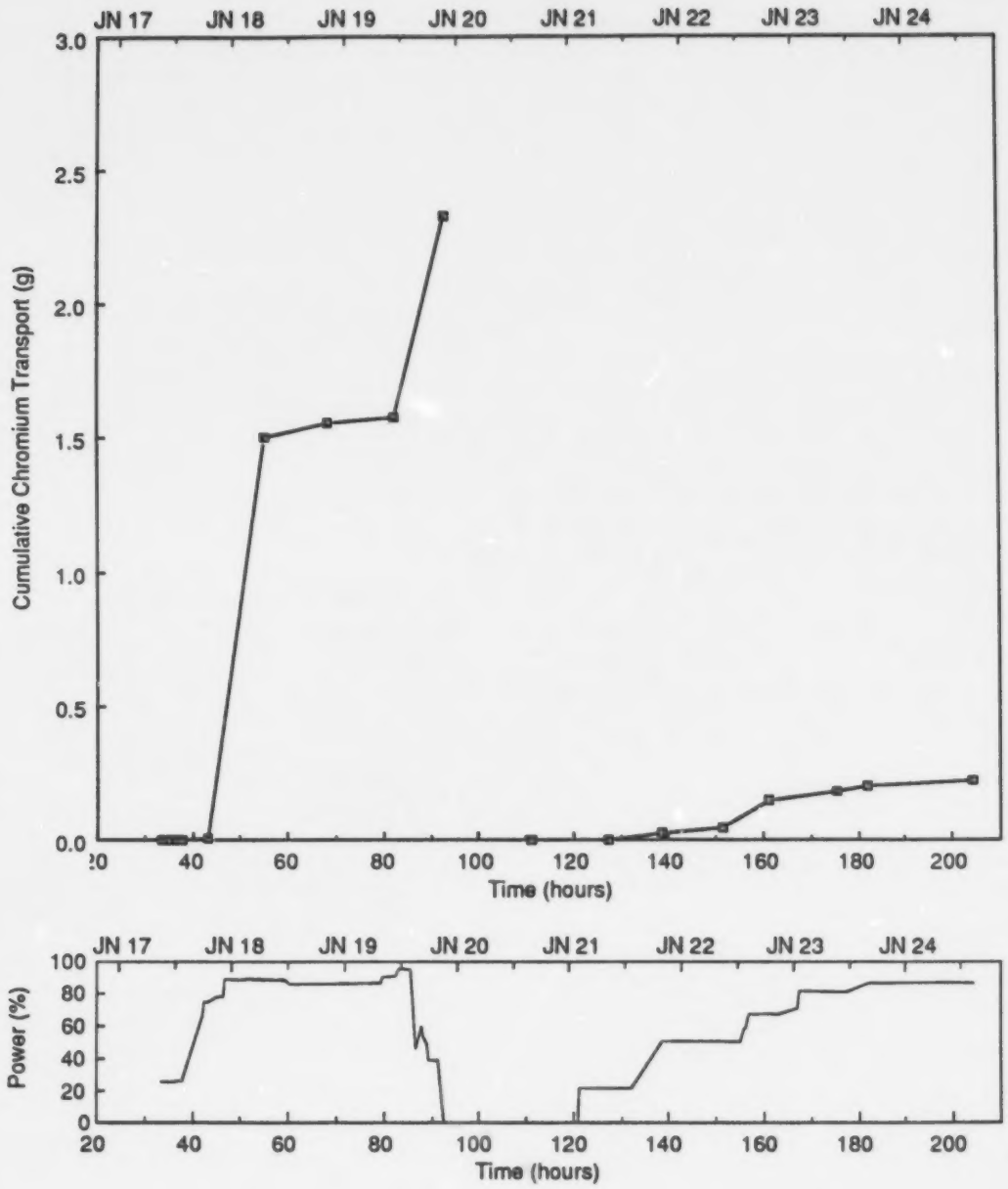


FIGURE 4.2.25

CUMULATIVE CHROMIUM TRANSPORT IN
REHEATER DRAINS OF BRUCE B-7
DURING JUNE 1988 STARTUP

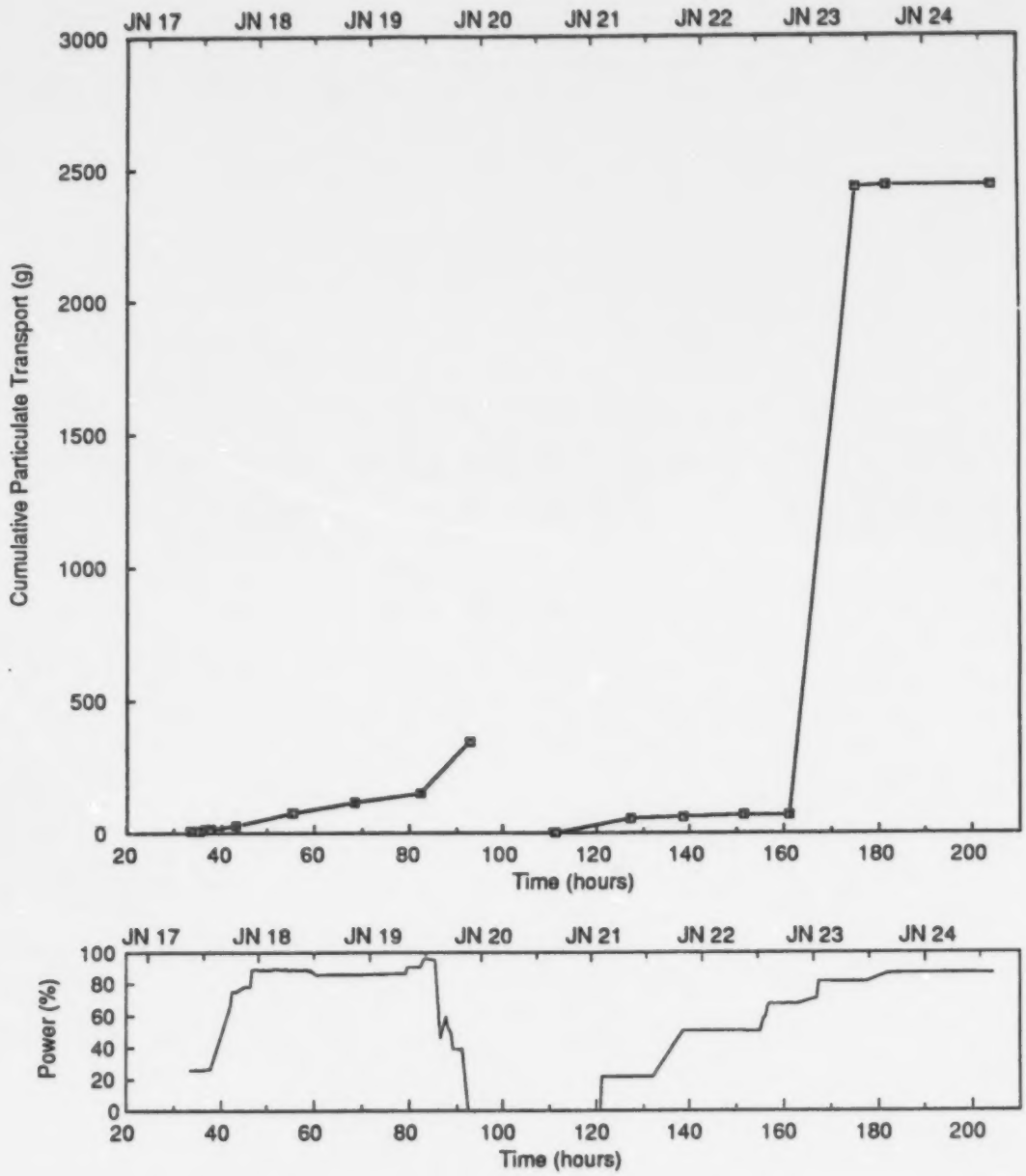


FIGURE 4.2.26

CUMULATIVE PARTICULATE TRANSPORT IN
BLOWOFF OF BRUCE B-7
DURING JUNE 1988 STARTUP

APPENDIX A

This appendix summarizes the April 1988 sampling data at Bruce-7 in the following tables:

A-1 Description of Filter Deposits Collected During April 1988 Shutdown

A-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Shutdown April 1988

A-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Shutdown April 1988

A-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Shutdown April 1988

A-5 Total Element Concentration at Sampling Locations of Bruce-7 During Shutdown April 1988

A-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During April 1988 Shutdown

A-7 Corrosion Product Concentration Profile at 8 Sampling Locations of Bruce-7 During April 1988 Shutdown

A-8 Cumulative Transport of Corrosion Products at Bruce-7 During April 1988 Shutdown

A-9 Water Chemistry Data of Bruce-7 April 6 - 15, 1988

A-10 System Flow Data of Bruce-7 During April 1988 Shutdown

A-11 Average System Flow During Sampling Runs During Shutdown April 1988

List of Figures

A-I System Flow at Condensate Extraction Pump Discharge of Bruce-7 During April 1988 Shutdown

A-II System Flow at Boiler Feed Pump Discharge of Bruce-7 During April 1988 Shutdown

TABLE: A-1 Description of Filter Deposits Collected During April 1988 Shutdown

Sample Number	Sample Location	Description of Deposit on Filter		
		Colour	Loading	Remark
B88-04-R1-FC1	Cond Ext Pump	light brown	light deposit	few black particles
B88-04-R1-FC2	HP Heater 5A	light brown	uneven stain	
B88-04-R1-FC3	Boiler Feed Pump	no sample	no sample	
B88-04-R1-FC4	SG Blow Off	dark brown	medium deposit	fine particles
B88-04-R1-FC5	SG Feedwater	brown	light uneven stain	
B88-04-R1-FC6	PreHtr to SG 1-4	dark brown	uneven stain	
B88-04-R1-FC7	Reheater Drain	light brown	v. light stain	
B88-04-R1-FC8	Moist Sepr Drn	light brown	v. light stain	few black particles
B88-04-R2-FC1	Cond Ext Pump	brown	medium deposit	
B88-04-R2-FC2	HP Heater 5A	dark brown	medium deposit	fine particles
B88-04-R2-FC3	Boiler Feed Pump	reddish brown	light deposit	
B88-04-R2-FC4	SG Blow Off	reddish brown	medium deposit	
B88-04-R2-FC5	SG Feedwater	brown	very light stain	
B88-04-R2-FC6	PreHtr to SG 1-4	light brown	light uneven stain	
B88-04-R2-FC7	Reheater Drain	light brown	uneven stain	
B88-04-R2-FC8	Moist Sepr Drn	light brown	light stain	few black particles
B88-04-R3-FC1	Cond Ext Pump	brown	medium deposit	
B88-04-R3-FC2	HP Heater 5A	dark reddish brown	light deposit	fine particles
B88-04-R3-FC3	Boiler Feed Pump	dark reddish brown	light deposit	fine particles
B88-04-R3-FC4	SG Blow Off	dark brown	heavy deposit	coarse particles
B88-04-R3-FC5	SG Feedwater	dark reddish brown	light stain	
B88-04-R3-FC6	PreHtr to SG 1-4	dark brown	light stain	
B88-04-R3-FC7	Reheater Drain	dark brown	light deposit	fine particles
B88-04-R3-FC8	Moist Sepr Drn	black	heavy deposit	coarse particles
B88-04-R4-FC1	Cond Ext Pump	brown	medium deposit	
B88-04-R4-FC2	HP Heater 5A	brown	light deposit	
B88-04-R4-FC3	Boiler Feed Pump	reddish brown	light deposit	
B88-04-R4-FC4	SG Blow Off	black brown	heavy deposit	
B88-04-R4-FC5	SG Feedwater	dark brown	light uneven stain	
B88-04-R4-FC6	PreHtr to SG 1-4	dark brown	light uneven stain	
B88-04-R4-FC7	Reheater Drain	dark brown	light uneven stain	
B88-04-R4-FC8	Moist Sepr Drn	dark brown	light stain	
B88-04-R5-FC1	Cond Ext Pump	brown	medium deposit	fine particles
B88-04-R5-FC2	HP Heater 5A	dark brown	medium deposit	fine particles
B88-04-R5-FC3	Boiler Feed Pump	reddish brown	medium deposit	few large particles
B88-04-R5-FC4	SG Blow Off	dark brown	heavy deposit	few large particles
B88-04-R5-FC5	SG Feedwater	dark brown	light uneven stain	
B88-04-R5-FC6	PreHtr to SG 1-4	brown	light uneven stain	
B88-04-R5-FC7	Reheater Drain	dark brown	light uneven stain	
B88-04-R5-FC8	Moist Sepr Drn	dark brown	light uneven stain	

TABLE: A-1 Description of Filter Deposits Collected During April 1988 Shutdown (cont'd)

Sample Number	Sample Location	Description of Deposit on Filter		
		Colour	Loading	Remark
B88-04-R6-FC1	Cond Ext Pump	brown	heavy deposit	
B88-04-R6-FC2	HP Heater 5A	brown	heavy deposit	
B88-04-R6-FC3	Boiler Feed Pump	brown	heavy deposit	
B88-04-R6-FC4	SG Blow Off	dark brown	light deposit	
B88-04-R6-FC5	SG Feedwater	brown	medium deposit	
B88-04-R6-FC6	PreHtr to SG 1-4	brown	stain	
B88-04-R6-FC7	Reheater Drain	only a few	black shiny particle	few black particles collected
B88-04-R6-FC8	Moist Sepr Drn	dark brown	medium deposit	few black particles
B88-04-R7-FC1	Cond Ext Pump	brown	medium deposit	
B88-04-R7-FC2	HP Heater 5A	brown	light deposit	
B88-04-R7-FC3	Boiler Feed Pump	brown	heavy deposit	
B88-04-R7-FC4	SG Blow Off	reddish purple	v.light deposit	
B88-04-R7-FC5	SG Feedwater	dark brown	v.heavy deposit	
B88-04-R7-FC6	PreHtr to SG 1-4	reddish dark brown	heavy deposit	
B88-04-R7-FC7	Reheater Drain	no sample	no sample	

TABLE: A-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Shutdown April, 1988

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol (L)	Particle Wt.(mg)	Particle conc.(ug/L)
B88-04-R1-FC1	Cond Ext Pump	Apr 7/88	11:13-19:33	8.33	187.21	1.20	6.41
B88-04-R1-FC2	HP Heater 5A	Apr 7/88	11:13-19:33	8.33	207.56	0.00	0.00
B88-04-R1-FC3	Boiler Feed Pump	Apr 7/88	11:13-19:33	8.33	209.54	0.00	0.00
B88-04-R1-FC4	SG Blow Off	Apr 7/88	11:13-19:33	8.33	194.97	6.20	31.80
B88-04-R1-FC5	SG Feedwater	Apr 7/88	11:13-19:33	8.33	187.67	0.60	3.20
B88-04-R1-FC6	PreHtr to SG 1-4	Apr 7/88	11:13-19:33	8.33	192.43	0.20	1.04
B88-04-R1-FC7	Reheater Drain	Apr 7/88	11:13-19:33	8.33	182.16	0.10	0.55
B88-04-R1-FC8	Moist Sepr Drn	Apr 7/88	11:13-19:33	8.33	175.35	0.20	1.14
B88-04-R2-FC1	Cond Ext Pump	Apr 7-8/88	20:35-08:35	12.00	277.91	4.30	15.47
B88-04-R2-FC2	HP Heater 5A	Apr 7-8/88	20:35-08:35	12.00	269.38	1.90	7.05
B88-04-R2-FC3	Boiler Feed Pump	Apr 7-8/88	20:35-08:35	12.00	273.86	0.70	2.56
B88-04-R2-FC4	SG Blow Off	Apr 7-8/88	20:35-08:35	12.00	287.31	3.30	11.49
B88-04-R2-FC5	SG Feedwater	Apr 7-8/88	20:35-08:35	12.00	276.35	0.90	3.26
B88-04-R2-FC6	PreHtr to SG 1-4	Apr 7-8/88	20:35-08:35	12.00	282.56	0.30	1.06
B88-04-R2-FC7	Reheater Drain	Apr 7-8/88	20:35-08:35	12.00	290.34	0.20	0.69
B88-04-R2-FC8	Moist Sepr Drn	Apr 7-8/88	20:35-08:35	12.00	292.56	1.80	6.15
B88-04-R3-FC1	Cond Ext Pump	Apr 13-14/88	15:10-08:30	17.33	202.22	11.20	55.39
B88-04-R3-FC2	HP Heater 5A	Apr 13-14/88	15:10-08:30	17.33	299.18	4.40	14.71
B88-04-R3-FC3	Boiler Feed Pump	Apr 13-14/88	15:10-08:30	17.33	267.63	5.40	20.18
B88-04-R3-FC4	SG Blow Off	Apr 13-14/88	15:10-08:30	17.33	165.39	1054.90	6378.26
B88-04-R3-FC5	SG Feedwater	Apr 13-14/88	15:10-08:30	17.33	291.32	2.10	7.21
B88-04-R3-FC6	PreHtr to SG 1-4	Apr 13-14/88	15:10-08:30	17.33	277.46	0.70	2.52
B88-04-R3-FC7	Reheater Drain	Apr 13-14/88	15:10-08:30	17.33	550.57	1.30	2.36
B88-04-R3-FC8	Moist Sepr Drn	Apr 13-14/88	15:10-08:30	17.33	308.89	37.20	120.43
B88-04-R4-FC1	Cond Ext Pump	Apr 14/88	11:30-20:30	9.00	197.98	4.20	21.21
B88-04-R4-FC2	HP Heater 5A	Apr 14/88	11:30-20:30	9.00	210.57	0.60	2.85
B88-04-R4-FC3	Boiler Feed Pump	Apr 14/88	11:30-20:30	9.00	217.34	1.00	4.60
B88-04-R4-FC4	SG Blow Off	Apr 14/88	11:30-20:30	9.00	193.56	43.50	224.74
B88-04-R4-FC5	SG Feedwater	Apr 14/88	11:30-20:30	9.00	189.55	0.60	3.17
B88-04-R4-FC6	PreHtr to SG 1-4	Apr 14/88	11:30-20:30	9.00	200.67	1.00	4.98
B88-04-R4-FC7	Reheater Drain	Apr 14/88	11:30-20:30	9.00	199.11	0.40	2.01
B88-04-R4-FC8	Moist Sepr Drn	Apr 14/88	11:30-20:30	9.00	206.74	2.10	10.16
B88-04-R5-FC1	Cond Ext Pump	Apr 14-15/88	21:50-08:30	10.67	211.55	8.20	38.76
B88-04-R5-FC2	HP Heater 5A	Apr 14-15/88	21:50-08:30	10.67	255.63	0.80	3.13
B88-04-R5-FC3	Boiler Feed Pump	Apr 14-15/88	21:50-08:30	10.67	258.53	1.60	6.19
B88-04-R5-FC4	SG Blow Off	Apr 14-15/88	21:50-08:30	10.67	241.96	44.40	183.50
B88-04-R5-FC5	SG Feedwater	Apr 14-15/88	21:50-08:30	10.67	242.46	0.70	2.89
B88-04-R5-FC6	PreHtr to SG 1-4	Apr 14-15/88	21:50-08:30	10.67	304.21	0.10	0.33
B88-04-R5-FC7	Reheater Drain	Apr 14-15/88	21:50-08:30	10.67	245.82	0.20	0.81
B88-04-R5-FC8	Moist Sepr Drn	Apr 14-15/88	21:50-08:30	10.67	198.00	0.70	3.54

TABLE: A-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Shutdown April, 1988 (cont'd)

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol (L)	Particle Wt.(mg)	Particle conc.(ug/L)
B88-04-R6-FC1	Cond Ext Pump	Apr 15/88	09:30-20:00	10.50	225.14	11.70	51.97
B88-04-R6-FC2	HP Heater 5A	Apr 15/88	09:30-20:00	10.50	233.66	15.30	65.48
B88-04-R6-FC3	Boiler Feed Pump	Apr 15/88	09:30-20:00	10.50	224.48	15.60	69.49
B88-04-R6-FC4	SG Blow Off	Apr 15/88	09:30-20:00	10.50	175.17	874.70	4993.43
B88-04-R6-FC5	SG Feedwater	Apr 15/88	09:30-20:00	10.50	241.11	1.50	6.22
B88-04-R6-FC6	PreHtr to SG 1-4	Apr 15/88	09:30-20:00	10.50	247.36	2.20	8.89
B88-04-R6-FC7	Reheater Drain	Apr 15/88	09:30-20:00	10.50	218.32	73.80	338.04
B88-04-R6-FC8	Moist Sepr Drn	Apr 15/88	09:30-20:00	10.50	44.27	47.40	1070.70
B88-04-R7-FC1	Cond Ext Pump	Apr 15/88	21:55-22:45	0.83	88.28	15.60	176.71
B88-04-R7-FC2	HP Heater 5A	Apr 15/88	21:55-22:45	0.83	51.29	2.30	44.84
B88-04-R7-FC3	Boiler Feed Pump	Apr 15/88	21:55-22:45	0.83	142.39	11.50	80.76
B88-04-R7-FC4	SG Blow Off	Apr 15/88	21:55-22:45	0.83	65.66	2149.90	32742.92
B88-04-R7-FC5	SG Feedwater	Apr 15/88	21:55-22:45	0.83	55.04	62.70	1139.17
B88-04-R7-FC6	PreHtr to SG 1-4	Apr 15/88	21:55-22:45	0.83	75.52	6.80	90.04
B88-04-R7-FC7	Reheater Drain	Apr 15/88	21:55-22:45	0.83	82.40	0.60	7.28

TABLE: A-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Shutdown April 1988.

Sample Number	Weight of Element in Particulate (ug/Filter) Ni	Fe	Ti	Mn	Cr	Filterable Element Concentration (ug/L) Ni	Fe	Ti	Mn	Cr
B88-04-R1-FC1	10.00	1130.0	0.00	10.00	11.00	0.05	6.04	0.00	0.05	0.06
B88-04-R1-FC2	0.00	30.0	0.00	0.00	2.00	0.00	0.14	0.00	0.00	0.01
B88-04-R1-FC3	0.00	11.0	0.00	0.00	2.00	0.00	0.05	0.00	0.00	0.01
B88-04-R1-FC4	103.00	6200.0	60.00	53.00	23.00	0.53	31.80	0.31	0.27	0.12
B88-04-R1-FC5	2.80	173.0	0.00	2.10	0.00	0.01	0.92	0.00	0.01	0.00
B88-04-R1-FC6	1.80	150.0	0.00	0.00	0.00	0.01	0.78	0.00	0.00	0.00
B88-04-R1-FC7	0.00	36.0	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
B88-04-R1-FC8	1.70	622.0	0.00	3.20	0.00	0.01	3.55	0.00	0.02	0.00
B88-04-R2-FC1	7.00	1270.0	0.00	13.00	12.00	0.03	4.57	0.00	0.05	0.04
B88-04-R2-FC2	12.00	882.0	0.00	12.00	7.50	0.04	3.27	0.00	0.04	0.03
B88-04-R2-FC3	7.50	604.0	0.00	2.70	9.00	0.03	2.21	0.00	0.01	0.03
B88-04-R2-FC4	61.00	3270.0	39.00	30.00	15.00	0.21	11.38	0.14	0.10	0.05
B88-04-R2-FC5	4.10	254.0	0.00	2.10	0.00	0.01	0.92	0.00	0.01	0.00
B88-04-R2-FC6	2.70	220.0	0.00	0.00	0.00	0.01	0.78	0.00	0.00	0.00
B88-04-R2-FC7	0.00	58.0	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00
B88-04-R2-FC8	2.80	1039.0	0.00	3.20	0.00	0.01	3.55	0.00	0.01	0.00
B88-04-R3-FC1	24.00	6540.0	2.20	68.00	61.00	0.12	32.34	0.01	0.34	0.30
B88-04-R3-FC2	16.00	2660.0	1.70	15.00	28.00	0.05	8.89	0.01	0.05	0.09
B88-04-R3-FC3	22.00	3210.0	1.90	17.00	51.00	0.08	11.99	0.01	0.06	0.19
B88-04-R3-FC4	11748.10	668943.2	6090.38	5324.92	3427.92	71.03	4044.64	36.82	32.20	20.73
B88-04-R3-FC5	17.80	1020.0	0.00	5.40	2.20	0.06	3.50	0.00	0.02	0.01
B88-04-R3-FC6	4.90	627.0	0.00	3.70	1.10	0.02	2.26	0.00	0.01	0.00
B88-04-R3-FC7	8.00	1270.0	0.00	6.70	9.50	0.01	2.31	0.00	0.01	0.02
B88-04-R3-FC8	45.00	20100.0	15.00	80.00	51.00	0.15	65.07	0.05	0.26	0.17
B88-04-R4-FC1	8.00	2640.0	0.00	28.60	19.60	0.04	13.33	0.00	0.14	0.10
B88-04-R4-FC2	3.40	395.0	0.00	2.30	3.10	0.02	1.88	0.00	0.01	0.01
B88-04-R4-FC3	5.50	607.0	1.30	3.30	10.00	0.03	2.79	0.01	0.02	0.05
B88-04-R4-FC4	587.00	25200.0	233.00	192.00	132.00	3.03	130.19	1.20	0.99	0.68
B88-04-R4-FC5	7.20	395.0	0.00	2.40	0.00	0.04	2.08	0.00	0.01	0.00
B88-04-R4-FC6	3.50	453.0	0.00	2.60	0.00	0.02	2.26	0.00	0.01	0.00
B88-04-R4-FC7	4.10	385.0	0.00	4.60	0.00	0.02	1.93	0.00	0.02	0.00
B88-04-R4-FC8	3.10	1100.0	0.00	4.80	4.60	0.01	5.32	0.00	0.02	0.02
B88-04-R5-FC1	13.10	5000.0	0.00	54.80	34.90	0.06	23.64	0.00	0.26	0.16
B88-04-R5-FC2	4.10	479.0	0.00	2.70	3.70	0.02	1.87	0.00	0.01	0.01
B88-04-R5-FC3	6.50	723.0	1.50	3.90	12.00	0.03	2.80	0.01	0.02	0.05
B88-04-R5-FC4	578.00	25200.0	233.00	193.00	120.00	2.39	104.15	0.96	0.80	0.50
B88-04-R5-FC5	9.20	505.0	0.00	3.00	0.00	0.04	2.08	0.00	0.01	0.00
B88-04-R5-FC6	3.00	350.0	0.00	2.40	0.00	0.01	1.15	0.00	0.01	0.00
B88-04-R5-FC7	5.10	476.0	0.00	5.70	1.40	0.02	1.94	0.00	0.02	0.01
B88-04-R5-FC8	1.60	652.0	0.00	2.90	4.30	0.01	3.29	0.00	0.01	0.02

TABLE: A-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Shutdown April 1988. (cont'd)

Sample Number	Weight of Element in Particulate (ug/Filter) Ni	Fe	Ti	Mn	Cr	Filterable Element Concentration (ug/L) Ni	Fe	Ti	Mn	Cr
B88-04-R6-FC1	20.90	7140.0	8.30	37.00	36.80	0.09	31.71	0.04	0.16	0.16
B88-04-R6-FC2	28.80	9422.0	12.80	40.00	50.00	0.12	40.32	0.05	0.17	0.21
B88-04-R6-FC3	31.80	8800.0	11.60	43.00	65.00	0.14	39.20	0.05	0.19	0.29
B88-04-R6-FC4	10517.50	535500.0	4830.00	4200.00	2432.50	60.04	3057.03	27.57	23.98	13.89
B88-04-R6-FC5	11.60	1170.0	3.30	6.90	6.70	0.05	4.85	0.01	0.03	0.03
B88-04-R6-FC6	7.90	1120.0	2.30	4.10	5.40	0.03	4.53	0.01	0.02	0.02
B88-04-R6-FC7	120.00	23000.0	18.90	119.00	98.90	0.55	105.35	0.09	0.55	0.45
B88-04-R6-FC8	96.00	25700.0	35.50	152.00	129.00	2.17	580.53	0.80	3.43	2.91
B88-04-R7-FC1	19.80	9000.0	7.90	60.00	36.80	0.22	101.95	0.09	0.68	0.42
B88-04-R7-FC2	5.30	1740.0	2.20	9.10	10.00	0.10	33.92	0.04	0.18	0.19
B88-04-R7-FC3	22.00	7050.0	6.90	34.00	49.00	0.15	49.51	0.05	0.24	0.34
B88-04-R7-FC4	25167.88	1291560.7	11120.69	9754.99	6360.25	383.31	19670.43	169.37	148.57	96.87
B88-04-R7-FC5	549.00	32900.0	114.00	101.00	206.00	9.97	597.75	2.07	1.84	3.74
B88-04-R7-FC6	88.00	420.0	14.00	11.00	31.00	1.17	5.56	0.19	0.15	0.41
B88-04-R7-FC7	0.00	157.0	0.00	0.00	0.00	0.00	1.91	0.00	0.00	0.00

TABLE: A-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Shutdown April 1988.

Sample Number	Filtrate Vol(ltr)	Weight of Element on IX Paper (ug/Filter) Ni(IX)	Fe(IX)	Ti(IX)	Mn(IX)	Cr(IX)	Non-filterable Element Concentration (ug/L) Ni(IX)	Fe(IX)	Ti(IX)	Mn(IX)	Cr(IX)
B88-04-R1-FC1											
B88-04-R1-FC2											
B88-04-R1-FC3	17.75										
B88-04-R1-FC4											
B88-04-R1-FC5											
B88-04-R1-FC6											
B88-04-R1-FC7											
B88-04-R1-FC8											
B88-04-R2-FC1	25.50	0.75	17.0	5.00	1.00	0.00	0.03	0.67	0.20	0.04	0.00
B88-04-R2-FC2	27.45	6.40	9.9	0.00	3.00	2.00	0.23	0.36	0.00	0.11	0.07
B88-04-R2-FC3	34.90	1.00	32.0	0.00	3.20	0.00	0.03	0.92	0.00	0.09	0.00
B88-04-R2-FC4	32.15	5.40	121.0	0.00	241.00	1.00	0.17	3.76	0.00	7.50	0.03
B88-04-R2-FC5	27.20	2.00	49.0	0.00	7.60	2.40	0.07	1.80	0.00	0.28	0.09
B88-04-R2-FC6	39.50	3.90	54.0	0.00	7.50	1.60	0.10	1.37	0.00	0.19	0.04
B88-04-R2-FC7	25.75	2.20	40.0	0.00	10.40	0.00	0.09	1.55	0.00	0.40	0.00
B88-04-R2-FC8	23.80	2.30	760.0	0.00	29.00	3.20	0.10	31.93	0.00	1.22	0.13
B88-04-R3-FC1	24.50	6.50	94.0	0.00	2.80	14.00	0.27	3.84	0.00	0.11	0.57
B88-04-R3-FC2	50.00	11.00	110.0	0.00	6.50	28.00	0.22	2.20	0.00	0.13	0.56
B88-04-R3-FC3	43.00	5.50	46.0	0.00	6.40	4.80	0.13	1.07	0.00	0.15	0.11
B88-04-R3-FC4	16.00	5.50	135.0	0.00	212.00	6.30	0.34	8.44	0.00	13.25	0.39
B88-04-R3-FC5	38.00	6.70	137.0	0.00	14.00	0.00	0.18	3.61	0.00	0.37	0.00
B88-04-R3-FC6	28.00	4.50	47.0	0.00	1.30	3.00	0.16	1.68	0.00	0.05	0.11
B88-04-R3-FC7	50.00	1.80	252.0	0.00	24.80	5.70	0.04	5.04	0.00	0.50	0.11
B88-04-R3-FC8	50.00	4.90	317.0	0.00	20.00	4.00	0.10	6.34	0.00	0.40	0.08
B88-04-R4-FC1	10.00	5.60	2650.0	0.00	104.00	2.20	0.56	265.00	0.00	10.40	0.22
B88-04-R4-FC2	10.00	1.60	27.0	0.00	0.00	6.00	0.16	2.70	0.00	0.00	0.60
B88-04-R4-FC3	13.50	1.00	12.0	3.00	1.00	1.70	0.07	0.89	0.22	0.07	0.13
B88-04-R4-FC4	13.00	14.00	162.0	2.70	121.00	9.60	1.08	12.46	0.21	9.31	0.74
B88-04-R4-FC5	13.20	4.00	42.0	4.60	2.90	6.10	0.30	3.18	0.35	0.22	0.46
B88-04-R4-FC6	13.00	3.10	30.0	0.00	3.20	3.40	0.24	2.31	0.00	0.25	0.26
B88-04-R4-FC7	13.50	3.20	24.0	0.00	2.80	5.90	0.24	1.78	0.00	0.21	0.44
B88-04-R4-FC8	11.80	1.70	313.0	0.00	9.60	7.70	0.14	26.53	0.00	0.81	0.65
B88-04-R5-FC1	17.80	1.10	8.9	0.00	0.50	2.40	0.06	0.50	0.00	0.03	0.13
B88-04-R5-FC2	33.00	1.90	11.0	0.00	2.20	2.30	0.06	0.33	0.00	0.07	0.07
B88-04-R5-FC3	36.20	1.00	15.0	0.00	2.00	0.00	0.03	0.41	0.00	0.06	0.00
B88-04-R5-FC4	21.50	9.80	115.0	0.00	120.00	1.60	0.46	5.35	0.00	5.58	0.07
B88-04-R5-FC5	20.00	1.80	17.0	0.00	3.50	3.00	0.09	0.85	0.00	0.18	0.15
B88-04-R5-FC6	42.30	1.30	15.0	0.00	4.80	2.10	0.03	0.35	0.00	0.11	0.05
B88-04-R5-FC7	41.80	1.10	9.2	0.00	4.90	1.60	0.03	0.22	0.00	0.12	0.04
B88-04-R5-FC8	12.80	1.30	165.0	0.00	5.80	1.80	0.10	12.89	0.00	0.45	0.14

TABLE: A-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Shutdown April 1988. (cont'd)

Sample Number	Filtrate Vol(ltr)	Weight of Element on IX Paper (ug/Filter)					Non-filterable Element Concentration (ug/L)				
		Ni(IX)	Fe(IX)	Ti(IX)	Mn(IX)	Cr(IX)	Ni(IX)	Fe(IX)	Ti(IX)	Mn(IX)	Cr(IX)
B88-04-R6-FC1	23.50	4.00	676.0	2.50	4.50	6.80	0.17	28.77	0.11	0.19	0.29
B88-04-R6-FC2	21.50	2.40	15.0	0.00	1.70	4.30	0.11	0.70	0.00	0.08	0.20
B88-04-R6-FC3	31.80	1.10	9.0	0.00	1.40	0.00	0.03	0.28	0.00	0.04	0.00
B88-04-R6-FC4	13.00	2.90	54.0	0.00	35.00	3.30	0.22	4.15	0.00	2.69	0.25
B88-04-R6-FC5	19.00	2.50	12.0	0.00	2.30	2.70	0.13	0.63	0.00	0.12	0.14
B88-04-R6-FC6	21.00	1.30	11.0	0.00	2.00	2.00	0.06	0.52	0.00	0.10	0.10
B88-04-R6-FC7	19.80	1.20	13.0	0.00	1.60	4.00	0.06	0.66	0.00	0.08	0.20
B88-04-R6-FC8	6.00	1.60	105.0	0.00	1.00	3.00	0.27	17.50	0.00	0.17	0.50
B88-04-R7-FC1	6.50	1.90	33.0	0.00	0.80	3.90	0.29	5.08	0.00	0.12	0.60
B88-04-R7-FC2	5.50	1.10	33.0	0.00	0.50	3.80	0.20	6.00	0.00	0.09	0.69
B88-04-R7-FC3	13.00	1.60	11.0	8.70	0.60	4.20	0.12	0.85	0.67	0.05	0.32
B88-04-R7-FC4	2.00	2.00	32.0	0.00	8.40	6.80	1.00	16.00	0.00	4.20	3.40
B88-04-R7-FC5	2.80	1.80	9.6	5.40	0.00	3.80	0.64	3.43	1.93	0.00	1.36
B88-04-R7-FC6	19.00	2.70	15.0	0.00	1.40	4.50	0.14	0.79	0.00	0.07	0.24
B88-04-R7-FC7	4.50	1.70	11.0	0.00	0.80	2.40	0.38	2.44	0.00	0.18	0.53

TABLE: A-5 Total Element Concentration at Sampling Locations of Bruce-7 During Shutdown April 1988.

Sample Number	Element Total Concentration (ug/L) Ni(T)	Fe(T)	Ti(T)	Mn(T)	Cr(T)	Corrosion Product in Filterable Form (%) Ni	Fe	Ti	Mn	Cr
B88-04-R1-FC1										
B88-04-R1-FC2										
B88-04-R1-FC3										
B88-04-R1-FC4										
B88-04-R1-FC5										
B88-04-R1-FC6										
B88-04-R1-FC7										
B88-04-R1-FC8										
B88-04-R2-FC1	0.05	5.24	0.20	0.09	0.04	46.13	87.27	0.00	54.40	100.00
B88-04-R2-FC2	0.28	3.63	0.00	0.15	0.10	16.04	90.08	ERR	28.96	27.65
B88-04-R2-FC3	0.06	3.12	0.00	0.10	0.03	48.87	70.63	ERR	9.71	100.00
B88-04-R2-FC4	0.38	15.15	0.14	7.60	0.08	55.83	75.15	100.00	1.37	62.67
B88-04-R2-FC5	0.09	2.72	0.00	0.29	0.09	16.79	33.78	ERR	2.65	0.00
B88-04-R2-FC6	0.11	2.15	0.00	0.19	0.04	8.82	36.29	ERR	0.00	0.00
B88-04-R2-FC7	0.09	1.75	0.00	0.40	0.00	0.00	11.39	ERR	0.00	ERR
B88-04-R2-FC8	0.11	35.48	0.00	1.23	0.13	9.01	10.01	ERR	0.89	0.00
B88-04-R3-FC1	0.38	36.18	0.01	0.45	0.87	30.91	89.39	100.00	74.63	34.55
B88-04-R3-FC2	0.27	11.09	0.01	0.18	0.65	19.56	80.16	100.00	27.83	14.32
B88-04-R3-FC3	0.21	13.06	0.01	0.21	0.30	39.12	91.81	100.00	29.91	63.06
B88-04-R3-FC4	71.38	4053.08	36.82	45.45	21.12	99.52	99.79	100.00	70.84	98.14
B88-04-R3-FC5	0.24	7.11	0.00	0.39	0.01	25.74	49.27	ERR	4.79	100.00
B88-04-R3-FC6	0.18	3.94	0.00	0.06	0.11	9.90	57.38	ERR	22.31	3.57
B88-04-R3-FC7	0.05	7.35	0.00	0.51	0.13	28.76	31.40	ERR	2.39	13.15
B88-04-R3-FC8	0.24	71.41	0.05	0.66	0.25	59.78	91.12	100.00	39.30	67.36
B88-04-R4-FC1	0.60	278.33	0.00	10.54	0.32	6.73	4.79	ERR	1.37	31.03
B88-04-R4-FC2	0.18	4.58	0.00	0.01	0.61	9.17	40.99	ERR	100.00	2.39
B88-04-R4-FC3	0.10	3.68	0.23	0.09	0.17	25.46	75.86	2.62	17.01	26.76
B88-04-R4-FC4	4.11	142.65	1.41	10.30	1.42	73.79	91.26	85.29	9.63	48.01
B88-04-R4-FC5	0.34	5.27	0.35	0.23	0.46	11.14	39.57	0.00	5.45	0.00
B88-04-R4-FC6	0.26	4.57	0.00	0.26	0.26	6.82	49.45	ERR	5.00	0.00
B88-04-R4-FC7	0.26	3.71	0.00	0.23	0.44	7.99	52.10	ERR	10.02	0.00
B88-04-R4-FC8	0.16	31.85	0.00	0.84	0.67	9.43	16.71	ERR	2.77	3.30
B88-04-R5-FC1	0.12	24.14	0.00	0.29	0.30	50.05	97.93	ERR	90.22	55.03
B88-04-R5-FC2	0.07	2.21	0.00	0.08	0.08	21.79	84.90	ERR	13.68	17.20
B88-04-R5-FC3	0.05	3.21	0.01	0.07	0.05	47.65	87.10	100.00	21.45	100.00
B88-04-R5-FC4	2.84	109.50	0.96	6.38	0.57	83.98	95.12	100.00	12.50	86.95
B88-04-R5-FC5	0.13	2.93	0.00	0.19	0.15	29.66	71.02	ERR	6.60	0.00
B88-04-R5-FC6	0.04	1.51	0.00	0.12	0.05	24.29	76.44	ERR	6.50	0.00
B88-04-R5-FC7	0.05	2.16	0.00	0.14	0.04	44.08	89.79	ERR	16.51	12.95
B88-04-R5-FC8	0.11	16.18	0.00	0.47	0.16	7.37	20.35	ERR	3.13	13.38

TABLE: A-5 Total Element Concentration at Sampling Locations of Bruce-7 During Shutdown April 1988. (cont'd)

Sample Number	Element Total Concentration (ug/L)					Corrosion Product in Filterable Form (%)				
	Ni(T)	Fe(T)	Ti(T)	Mn(T)	Cr(T)	Ni	Fe	Ti	Mn	Cr
B88-04-R6-FC1	0.26	60.48	0.14	0.36	0.45	35.29	52.44	25.74	46.19	36.10
B88-04-R6-FC2	0.23	41.02	0.05	0.25	0.41	52.48	98.30	100.00	68.40	51.69
B88-04-R6-FC3	0.18	39.48	0.05	0.24	0.29	80.37	99.28	100.00	81.31	100.00
B88-04-R6-FC4	60.26	3061.18	27.57	26.67	14.14	99.63	99.86	100.00	89.90	98.20
B88-04-R6-FC5	0.18	5.48	0.01	0.15	0.17	26.77	88.48	100.00	19.12	16.36
B88-04-R6-FC6	0.09	5.05	0.01	0.11	0.12	34.03	89.63	100.00	14.82	18.65
B88-04-R6-FC7	0.61	106.01	0.09	0.63	0.66	90.07	99.38	100.00	87.09	69.16
B88-04-R6-FC8	2.44	598.03	0.80	3.60	3.41	89.05	97.07	100.00	95.37	85.35
B88-04-R7-FC1	0.52	107.03	0.09	0.80	1.02	43.42	95.26	100.00	84.67	40.99
B88-04-R7-FC2	0.30	39.92	0.04	0.27	0.89	34.07	84.97	100.00	66.12	22.01
B88-04-R7-FC3	0.28	50.36	0.72	0.28	0.67	55.66	98.32	6.75	83.80	51.58
B88-04-R7-FC4	384.31	19686.43	169.37	152.77	100.27	99.74	99.92	100.00	97.25	96.61
B88-04-R7-FC5	10.62	601.18	4.00	1.84	5.10	93.95	99.43	51.78	100.00	73.39
B88-04-R7-FC6	1.31	6.35	0.19	0.22	0.65	89.13	87.57	100.00	66.41	63.41
B88-04-R7-FC7	0.38	4.35	0.00	0.18	0.53	0.00	43.80	ERR	0.00	0.00

TABLE: A-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During April 1988 Shutdown

Sample Number	Sample Location	Filterable Element Molar Ratio (Fe = 1) Ni	Fe	Ti	Mn	Cr	Non-filterable Element Molar Ratio (Fe = 1) Ni	Fe	Ti	Mn	Cr
B88-04-R1-FC3	Boiler Feed Pump	0.0000	1.0000	0.0000	0.0000	0.1953					
B88-04-R2-FC3	Boiler Feed Pump	0.0118	1.0000	0.0000	0.0045	0.0160	0.0297	1.0000	0.0000	0.1017	0.0000
B88-04-R3-FC3	Boiler Feed Pump	0.0065	1.0000	0.0007	0.0054	0.0171	0.1138	1.0000	0.0000	0.1414	0.1121
B88-04-R4-FC3	Boiler Feed Pump	0.0086	1.0000	0.0025	0.0055	0.0177	0.0793	1.0000	0.2915	0.0847	0.1522
B88-04-R5-FC3	Boiler Feed Pump	0.0086	1.0000	0.0024	0.0055	0.0178	0.0634	1.0000	0.0000	0.1355	0.0000
B88-04-R6-FC3	Boiler Feed Pump	0.0034	1.0000	0.0015	0.0050	0.0079	0.1163	1.0000	0.0000	0.1581	0.0000
B88-04-R7-FC3	Boiler Feed Pump	0.0030	1.0000	0.0011	0.0049	0.0075	0.1384	1.0000	0.9222	0.0554	0.4101
B88-04-R1-FC1	Cond Ext Pump	0.0084	1.0000	0.0000	0.0090	0.0105					
B88-04-R2-FC1	Cond Ext Pump	0.0052	1.0000	0.0000	0.0104	0.0101	0.0420	1.0000	0.3429	0.0598	0.0000
B88-04-R3-FC1	Cond Ext Pump	0.0035	1.0000	0.0004	0.0106	0.0100	0.0658	1.0000	0.0000	0.0303	0.1600
B88-04-R4-FC1	Cond Ext Pump	0.0029	1.0000	0.0000	0.0110	0.0080	0.0020	1.0000	0.0000	0.0399	0.0009
B88-04-R5-FC1	Cond Ext Pump	0.0025	1.0000	0.0000	0.0111	0.0075	0.1176	1.0000	0.0000	0.0571	0.2896
B88-04-R6-FC1	Cond Ext Pump	0.0028	1.0000	0.0014	0.0053	0.0055	0.0056	1.0000	0.0043	0.0068	0.0108
B88-04-R7-FC1	Cond Ext Pump	0.0021	1.0000	0.0010	0.0068	0.0044	0.0548	1.0000	0.0000	0.0246	0.1269
B88-04-R1-FC2	HP Heater 5A	0.0000	1.0000	0.0000	0.0000	0.0716					
B88-04-R2-FC2	HP Heater 5A	0.0129	1.0000	0.0000	0.0138	0.0091	0.6151	1.0000	0.0000	0.3080	0.2170
B88-04-R3-FC2	HP Heater 5A	0.0057	1.0000	0.0007	0.0057	0.0113	0.0951	1.0000	0.0000	0.0601	0.2734
B88-04-R4-FC2	HP Heater 5A	0.0082	1.0000	0.0000	0.0059	0.0084	0.0564	1.0000	0.0000	0.0000	0.2387
B88-04-R5-FC2	HP Heater 5A	0.0081	1.0000	0.0000	0.0057	0.0083	0.1643	1.0000	0.0000	0.2033	0.2246
B88-04-R6-FC2	HP Heater 5A	0.0029	1.0000	0.0016	0.0043	0.0057	0.1522	1.0000	0.0000	0.1152	0.3079
B88-04-R7-FC2	HP Heater 5A	0.0029	1.0000	0.0015	0.0053	0.0062	0.0317	1.0000	0.0000	0.0154	0.1237
B88-04-R1-FC8	Moist Sepr Drn	0.0026	1.0000	0.0000	0.0052	0.0000					
B88-04-R2-FC8	Moist Sepr Drn	0.0026	1.0000	0.0000	0.0031	0.0000	0.0029	1.0000	0.0000	0.0388	0.0045
B88-04-R3-FC8	Moist Sepr Drn	0.0021	1.0000	0.0009	0.0040	0.0027	0.0147	1.0000	0.0000	0.0641	0.0136
B88-04-R4-FC8	Moist Sepr Drn	0.0027	1.0000	0.0000	0.0044	0.0045	0.0052	1.0000	0.0000	0.0312	0.0264
B88-04-R5-FC8	Moist Sepr Drn	0.0023	1.0000	0.0000	0.0045	0.0071	0.0075	1.0000	0.0000	0.0357	0.0117
B88-04-R6-FC8	Moist Sepr Drn	0.0036	1.0000	0.0016	0.0060	0.0054	0.0145	1.0000	0.0000	0.0097	0.0307
B88-04-R1-FC6	PreHtr to SG 1-4	0.0114	1.0000	0.0000	0.0000	0.0000					
B88-04-R2-FC6	PreHtr to SG 1-4	0.0117	1.0000	0.0000	0.0000	0.0000	0.0687	1.0000	0.0000	0.1412	0.0318
B88-04-R3-FC6	PreHtr to SG 1-4	0.0074	1.0000	0.0000	0.0060	0.0019	0.0911	1.0000	0.0000	0.0281	0.0686
B88-04-R4-FC6	PreHtr to SG 1-4	0.0074	1.0000	0.0000	0.0058	0.0000	0.0983	1.0000	0.0000	0.1084	0.1217
B88-04-R5-FC6	PreHtr to SG 1-4	0.0082	1.0000	0.0000	0.0070	0.0000	0.0825	1.0000	0.0000	0.3253	0.1504
B88-04-R6-FC6	PreHtr to SG 1-4	0.0067	1.0000	0.0024	0.0037	0.0052	0.1124	1.0000	0.0000	0.1848	0.1953
B88-04-R7-FC6	PreHtr to SG 1-4	0.1994	1.0000	0.0389	0.0266	0.0793	0.1713	1.0000	0.0000	0.0949	0.3222

TABLE: A-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During April 1988 Shutdown (cont'd)

Sample Number	Sample Location	Filterable Element Molar Ratio (Fe = 1) Ni	Fe	Ti	Mn	Cr	Non-filterable Element Molar Ratio (Fe = 1) Ni	Fe	Ti	Mn	Cr
B88-04-R1-FC7	Reheater Drain	0.0000	1.0000	0.0000	0.0000	0.0000					
B88-04-R2-FC7	Reheater Drain	0.0000	1.0000	0.0000	0.0000	0.0000	0.0523	1.0000	0.0000	0.2643	0.0000
B88-04-R3-FC7	Reheater Drain	0.0060	1.0000	0.0000	0.0054	0.0080	0.0068	1.0000	0.0000	0.1000	0.0243
B88-04-R4-FC7	Reheater Drain	0.0101	1.0000	0.0000	0.0121	0.0000	0.1269	1.0000	0.0000	0.1186	0.2640
B88-04-R5-FC7	Reheater Drain	0.0102	1.0000	0.0000	0.0122	0.0032	0.1138	1.0000	0.0000	0.5414	0.1868
B88-04-R6-FC7	Reheater Drain	0.0050	1.0000	0.0010	0.0053	0.0046	0.0878	1.0000	0.0000	0.1251	0.3305
B88-04-R7-FC7	Reheater Drain	0.0000	1.0000	0.0000	0.0000	0.0000	0.1470	1.0000	0.0000	0.0739	0.2343
B88-04-R1-FC4	SG Blow Off	0.0158	1.0000	0.0113	0.0087	0.0040					
B88-04-R2-FC4	SG Blow Off	0.0177	1.0000	0.0139	0.0093	0.0049	0.0425	1.0000	0.0000	2.0247	0.0089
B88-04-R3-FC4	SG Blow Off	0.0167	1.0000	0.0106	0.0081	0.0055	0.0388	1.0000	0.0000	1.5964	0.0501
B88-04-R4-FC4	SG Blow Off	0.0222	1.0000	0.0108	0.0077	0.0056	0.0822	1.0000	0.0194	0.7593	0.0636
B88-04-R5-FC4	SG Blow Off	0.0218	1.0000	0.0108	0.0078	0.0051	0.0811	1.0000	0.0000	1.0608	0.0149
B88-04-R6-FC4	SG Blow Off	0.0187	1.0000	0.0105	0.0080	0.0049	0.0511	1.0000	0.0000	0.6589	0.0656
B88-04-R7-FC4	SG Blow Off	0.0185	1.0000	0.0100	0.0077	0.0053	0.0595	1.0000	0.0000	0.2668	0.2282
B88-04-R1-FC5	SG Feedwater	0.0154	1.0000	0.0000	0.0123	0.0000					
B88-04-R2-FC5	SG Feedwater	0.0154	1.0000	0.0000	0.0084	0.0000	0.0388	1.0000	0.0000	0.1577	0.0526
B88-04-R3-FC5	SG Feedwater	0.0166	1.0000	0.0000	0.0054	0.0023	0.0465	1.0000	0.0000	0.1039	0.0000
B88-04-R4-FC5	SG Feedwater	0.0173	1.0000	0.0000	0.0062	0.0000	0.0906	1.0000	0.1277	0.0702	0.1560
B88-04-R5-FC5	SG Feedwater	0.0173	1.0000	0.0000	0.0060	0.0000	0.1007	1.0000	0.0000	0.2093	0.1895
B88-04-R6-FC5	SG Feedwater	0.0094	1.0000	0.0033	0.0060	0.0062	0.1982	1.0000	0.0000	0.1948	0.2417
B88-04-R7-FC5	SG Feedwater	0.0159	1.0000	0.0040	0.0031	0.0067	0.1784	1.0000	0.6559	0.0000	0.4251

TABLE: A-7 Corrosion Product Concentration Profile at 8 Sampling Locations of Bruce-7 During April 1988, Shutdown

Sample Number	Sample Location	Particle conc.(ug/L)	Element Total Concentration (ug/L) Ni	Fe	Ti	Mn	Cr
B88-04-R1-FC3	Boiler Feed Pump	0.00					
B88-04-R2-FC3	Boiler Feed Pump	2.56	0.06	3.12	0.00	0.10	0.03
B88-04-R3-FC3	Boiler Feed Pump	20.18	0.21	13.06	0.01	0.21	0.30
B88-04-R4-FC3	Boiler Feed Pump	4.60	0.10	3.68	0.23	0.09	0.17
B88-04-R5-FC3	Boiler Feed Pump	6.19	0.05	3.21	0.01	0.07	0.05
B88-04-R6-FC3	Boiler Feed Pump	69.49	0.18	39.48	0.05	0.24	0.29
B88-04-R7-FC3	Boiler Feed Pump	80.76	0.28	50.36	0.72	0.28	0.67
B88-04-R1-FC1	Cond Ext Pump	6.41					
B88-04-R2-FC1	Cond Ext Pump	15.47	0.05	5.24	0.20	0.09	0.04
B88-04-R3-FC1	Cond Ext Pump	55.39	0.38	36.18	0.01	0.45	0.87
B88-04-R4-FC1	Cond Ext Pump	21.21	0.60	278.33	0.00	10.54	0.32
B88-04-R5-FC1	Cond Ext Pump	38.76	0.12	24.14	0.00	0.29	0.30
B88-04-R6-FC1	Cond Ext Pump	51.97	0.26	60.48	0.14	0.36	0.45
B88-04-R7-FC1	Cond Ext Pump	176.71	0.52	107.03	0.09	0.80	1.02
B88-04-R1-FC2	HP Heater 5A	0.00					
B88-04-R2-FC2	HP Heater 5A	7.05	0.28	3.63	0.00	0.15	0.10
B88-04-R3-FC2	HP Heater 5A	14.71	0.27	11.09	0.01	0.18	0.65
B88-04-R4-FC2	HP Heater 5A	2.85	0.18	4.58	0.00	0.01	0.61
B88-04-R5-FC2	HP Heater 5A	3.13	0.07	2.21	0.00	0.08	0.08
B88-04-R6-FC2	HP Heater 5A	65.48	0.23	41.02	0.05	0.25	0.41
B88-04-R7-FC2	HP Heater 5A	44.84	0.30	39.92	0.04	0.27	0.89
B88-04-R1-FC8	Moist Sepr Drn	1.14					
B88-04-R2-FC8	Moist Sepr Drn	6.15	0.11	35.48	0.00	1.23	0.13
B88-04-R3-FC8	Moist Sepr Drn	120.43	0.24	71.41	0.05	0.66	0.25
B88-04-R4-FC8	Moist Sepr Drn	10.16	0.16	31.85	0.00	0.84	0.67
B88-04-R5-FC8	Moist Sepr Drn	3.54	0.11	16.18	0.00	0.47	0.16
B88-04-R6-FC8	Moist Sepr Drn	1070.70	2.44	598.03	0.80	3.60	3.41
B88-04-R1-FC6	PreHtr to SG 1-4	1.04					
B88-04-R2-FC6	PreHtr to SG 1-4	1.06	0.11	2.15	0.00	0.19	0.04
B88-04-R3-FC6	PreHtr to SG 1-4	2.52	0.18	3.94	0.00	0.06	0.11
B88-04-R4-FC6	PreHtr to SG 1-4	4.98	0.26	4.57	0.00	0.26	0.26
B88-04-R5-FC6	PreHtr to SG 1-4	0.33	0.04	1.51	0.00	0.12	0.05
B88-04-R6-FC6	PreHtr to SG 1-4	8.89	0.09	5.05	0.01	0.11	0.12
B88-04-R7-FC6	PreHtr to SG 1-4	90.04	1.31	6.35	0.19	0.22	0.65
B88-04-R1-FC7	Reheater Drain	0.55					
B88-04-R2-FC7	Reheater Drain	0.69	0.09	1.75	0.00	0.40	0.00
B88-04-R3-FC7	Reheater Drain	2.36	0.05	7.35	0.00	0.51	0.13
B88-04-R4-FC7	Reheater Drain	2.01	0.26	3.71	0.00	0.23	0.44
B88-04-R5-FC7	Reheater Drain	0.81	0.05	2.16	0.00	0.14	0.04
B88-04-R6-FC7	Reheater Drain	338.04	0.61	106.01	0.09	0.63	0.66
B88-04-R7-FC7	Reheater Drain	7.28	0.38	4.35	0.00	0.18	0.53
B88-04-R1-FC4	SG Blow Off	31.80					
B88-04-R2-FC4	SG Blow Off	11.49	0.38	15.15	0.14	7.60	0.08
B88-04-R3-FC4	SG Blow Off	6378.26	71.38	4053.08	36.82	45.45	21.12
B88-04-R4-FC4	SG Blow Off	224.74	4.11	142.65	1.41	10.30	1.42
B88-04-R5-FC4	SG Blow Off	183.50	2.84	109.50	0.96	6.38	0.57
B88-04-R6-FC4	SG Blow Off	4993.43	60.26	3061.18	27.57	26.67	14.14
B88-04-R7-FC4	SG Blow Off	32742.92	384.31	19686.43	169.37	152.77	100.27
B88-04-R1-FC5	SG Feedwater	3.20					
B88-04-R2-FC5	SG Feedwater	3.26	0.09	2.72	0.00	0.29	0.09
B88-04-R3-FC5	SG Feedwater	7.21	0.24	7.11	0.00	0.39	0.01
B88-04-R4-FC5	SG Feedwater	3.17	0.34	5.27	0.35	0.23	0.46
B88-04-R5-FC5	SG Feedwater	2.89	0.13	2.93	0.00	0.19	0.15
B88-04-R6-FC5	SG Feedwater	6.22	0.18	5.48	0.01	0.15	0.17
B88-04-R7-FC5	SG Feedwater	1139.17	10.62	601.18	4.00	1.84	5.10

TABLE: A-8 Cumulative Transport of Corrosion Products at Bruce-7 During April 1988 Shutdown

Sample Number	Sample Location	System Flow kg/s	Reference Time (hr)	Cumulative Transport in grams					
				Particle	Ni	Fe	Ti	Mn	Cr
B88-04-R1-FC3	Boiler Feed Pump								
B88-04-R2-FC3	Boiler Feed Pump		15.00						
B88-04-R3-FC3	Boiler Feed Pump	775.77	33.00	1014.30	10.56	656.72	0.36	10.68	15.19
B88-04-R4-FC3	Boiler Feed Pump	721.44	46.00	1169.65	13.92	781.03	8.06	13.69	21.00
B88-04-R5-FC3	Boiler Feed Pump	819.09	57.00	1370.39	15.63	885.18	8.25	15.97	22.50
B88-04-R6-FC3	Boiler Feed Pump	844.64	68.00	3694.81	21.52	2205.86	9.98	23.85	32.19
B88-04-R7-FC3	Boiler Feed Pump								
B88-04-R1-FC1	Cond Ext Pump								
B88-04-R2-FC1	Cond Ext Pump		15.00						
B88-04-R3-FC1	Cond Ext Pump	628.50	33.00	2255.66	15.64	1473.40	0.44	18.35	35.56
B88-04-R4-FC1	Cond Ext Pump	583.46	46.00	2834.94	32.03	9073.59	0.44	306.28	44.27
B88-04-R5-FC1	Cond Ext Pump	664.18	57.00	3854.43	35.29	9708.38	0.44	313.83	52.15
B88-04-R6-FC1	Cond Ext Pump	683.16	68.00	5260.31	42.40	11344.54	4.32	323.45	64.40
B88-04-R7-FC1	Cond Ext Pump								
B88-04-R1-FC2	HP Heater 5A								
B88-04-R2-FC2	HP Heater 5A		15.00						
B88-04-R3-FC2	HP Heater 5A	775.77	33.00	739.31	13.75	557.54	0.29	9.06	32.86
B88-04-R4-FC2	HP Heater 5A	721.44	46.00	835.52	19.70	712.04	0.29	9.42	53.61
B88-04-R5-FC2	HP Heater 5A	819.09	57.00	937.03	22.08	783.63	0.29	11.93	56.34
B88-04-R6-FC2	HP Heater 5A	844.64	68.00	3127.18	29.94	2155.70	2.12	20.30	70.19
B88-04-R7-FC2	HP Heater 5A								
B88-04-R1-FC8	Moist Sepr Drn								
B88-04-R2-FC8	Moist Sepr Drn		15.00						
B88-04-R3-FC8	Moist Sepr Drn		33.00						
B88-04-R4-FC8	Moist Sepr Drn		46.00						
B88-04-R5-FC8	Moist Sepr Drn		57.00						
B88-04-R6-FC8	Moist Sepr Drn		68.00						
B88-04-R1-FC6	PreHtr to SG 1-4								
B88-04-R2-FC6	PreHtr to SG 1-4		15.00						
B88-04-R3-FC6	PreHtr to SG 1-4	775.77	33.00	126.83	8.97	197.98	0.00	3.00	5.59
B88-04-R4-FC6	PreHtr to SG 1-4	721.44	46.00	295.08	17.61	352.12	0.00	11.75	14.42
B88-04-R5-FC6	PreHtr to SG 1-4	819.09	57.00	305.74	18.92	400.94	0.00	15.69	16.03
B88-04-R6-FC6	PreHtr to SG 1-4	844.64	68.00	603.22	22.06	569.90	0.31	19.43	19.94
B88-04-R7-FC6	PreHtr to SG 1-4								
B88-04-R1-FC7	Reheater Drain								
B88-04-R2-FC7	Reheater Drain		15.00						
B88-04-R3-FC7	Reheater Drain	30.00	33.00	4.59	0.10	14.28	0.00	0.99	0.26
B88-04-R4-FC7	Reheater Drain	30.00	46.00	7.41	0.46	19.49	0.00	1.31	0.87
B88-04-R5-FC7	Reheater Drain	30.00	57.00	8.38	0.52	22.05	0.00	1.48	0.92
B88-04-R6-FC7	Reheater Drain	30.00	68.00	409.96	1.24	147.99	0.10	2.22	1.70
B88-04-R7-FC7	Reheater Drain								
B88-04-R1-FC4	SG Blow Off								
B88-04-R2-FC4	SG Blow Off		15.00						
B88-04-R3-FC4	SG Blow Off	3.00	33.00	1239.93	13.88	787.92	7.16	8.83	4.11
B88-04-R4-FC4	SG Blow Off	3.00	46.00	1271.49	14.45	807.95	7.36	10.28	4.31
B88-04-R5-FC4	SG Blow Off	3.00	57.00	1293.29	14.79	820.96	7.47	11.04	4.37
B88-04-R6-FC4	SG Blow Off	3.00	68.00	1886.51	21.95	1184.62	10.75	14.21	6.05
B88-04-R7-FC4	SG Blow Off								
B88-04-R1-FC5	SG Feedwater								
B88-04-R2-FC5	SG Feedwater		15.00						
B88-04-R3-FC5	SG Feedwater	805.77	33.00	376.39	12.40	371.06	0.00	20.20	0.39
B88-04-R4-FC5	SG Feedwater	751.44	46.00	487.71	24.39	556.24	12.26	28.38	16.65
B88-04-R5-FC5	SG Feedwater	849.09	57.00	584.78	28.69	654.86	12.26	34.68	21.69
B88-04-R6-FC5	SG Feedwater	874.64	68.00	800.26	34.91	844.80	12.73	39.86	27.57
B88-04-R7-FC5	SG Feedwater								

TABLE: A-9 Water Chemistry Data of Bruce-7 April 6 - 15, 1988

DATE	TIME	SAMPLING POINT	pH	COND ms/m	Na ug/kg	D.O. ug/kg	HYDRAZINE ug/kg	MAKEUP kg/s	BLOWDOWN kg/s	COMMENTS
04-Apr-88	00:00	CEP	9.6	1.30	<2	<5	9.0	16.8		
		5A	9.6	1.40	<2	<5	51.0			
		MS	9.7	1.50	<2					
		Bo1-4	9.5	0.80	<2				1.1	
		Bo5-8	9.5	0.80	<2				1.4	
05-Apr-88	00:00	CEP	9.8	1.50		5-10	12.0			
		5A	9.8	1.50		<5	54.0			
		MS	9.8	1.50						
		Bo1-4	9.5	0.90	2					
		Bo5-8	9.5	0.90	3					
06-Apr-88	00:00	CEP	9.8	1.40	<2	10	12.0			
		5A	9.7	1.40	<2	5-10	50.0			
		MS	9.8	1.40	<2					
		Bo1-4	9.4	0.70	<2					
		Bo5-8	9.3	0.70	<2					
07-Apr-88	00:00	CEP	9.6	1.20	<2	15	12.0	24.1		
		5A	9.6	1.20	<2	<5	47.0			
		MS	9.6	1.20	<2					
		Bo1	9.3	0.60	<2					
		Bo2	9.3	0.60	<2					
		Bo3	9.3	0.60	<2				1.2	
		Bo4	9.3	0.60	<2					
		Bo5	9.3	0.60	<2					
		Bo6	9.3	0.60	<2					
		Bo7	9.3	0.60	<2				1.5	
		Bo8	9.3	0.60	<2					
07-Apr-88	20:00	CEP	9.5	1.20	<2	15	9.0	17.3		
		5A	9.5	1.20	<2	<5	45.0			
		MS	9.6	1.30	<2					
		Bo1-4	9.4	0.60	<2				1.1	
		Bo5-8	9.4	0.60	<2				1.5	
08-Apr-88	20:00	CEP	9.7	1.40	<2	10	12.0	14.7		
		5A	9.7	1.40	<2	<5	46.0			
		MS	9.7	1.50	<2					
		Bo1-4	9.4	0.80	<2				1.1	
		Bo5-8	9.4	0.80	<2				1.5	
09-Apr-88	20:00	CEP	9.6	1.20	<2	10	16.0	20.3		
		5A	9.6	1.20	<2	<5	53.0			
		MS	9.7	1.30	<2					
		Bo1-4	9.3	0.60	3				1.0	
		Bo5-8	9.3	0.60	<2				1.4	
10-Apr-88	20:30	CEP	9.7	1.40	<2	10	16.0	18.4		
		5A	9.6	1.50	<2	<5	47.0			
		MS	9.7	1.60	<2					
		Bo1-4	9.4	0.80	<2				1.2	
		Bo5-8	9.4	0.90	<2				1.5	

TABLE: A-9 Water Chemistry Data of Bruce-7 April 6 - 15, 1988 (cont'd)

DATE	TIME	SAMPLING POINT	pH	COND ms/m	Na ug/kg	D.O. ug/kg	HYDRAZINE ug/kg	MAKEUP kg/s	BLOWDOWN kg/s	COMMENTS
12-Apr-88	03:00	CEP	9.80	1.20	<2	<5	167.0	18.3		
		5A	9.60	1.90	<2	<5	706.0			
		MS	9.80	2.00	<2					
		Bo1-4	9.70	1.10	<2				1.4	
		Bo5-8	9.60	1.00	<2				1.4	
	14:00	5A					460.0			
		CEP	9.60							
13-Apr-88	00:00	CEP	9.70	1.50	<2	10	15.0	20.1		
		5A	9.70	1.50	<2	<5	60.0			
		MS	9.80	1.60	<2					
		Bo1-4	9.40	0.80	<2				1.4	
		Bo5-8	9.40	0.80	<2				1.4	
14-Apr-88	00:00	CEP	9.60	0.90		5-10	13.0			
		HP	9.60	0.90		<5	52.0			
		MS	9.60	1.00						
		Bo1	9.30	0.50	16					Bo1 blowoff
		Bo2	9.30	0.70	<2					1/2 hour
		Bo3	9.30	0.70	<2					
		Bo4	9.30	0.70	<2					
		Bo5	9.30	0.70	<2					
		Bo6	9.30	0.80	<2					
		Bo7	9.30	0.70	<2					
		Bo8	9.30	0.70	<2					
	06:00	Bo1								
15-Apr-88	00:00	CEP	9.60	1.40	<2	5-10	64.0			
		HP	9.60	1.30	<2	<5	224.0			
		MS	9.70	1.50	<2					
		Bo1-4	9.40	0.80	<2					
		Bo5-8	9.40	0.80	<2					
16-Apr-88	00:30	CEP	9.90	2.90	<2	10		18.4		
		5A	10.20	3.30	<2	15				
		MS	10.20	3.80	<2					
		Bo1-4	9.80	2.10	<2				1.3	
		Bo5-8	9.60	1.80	<2				1.4	

TABLE: A-10 System Flow Data of Bruce-7 During April 1988 Shutdown

DATE	CLOCK TIME		REF. TIME	POWER	LEVEL	FLOW RATE (kg/s)	
	HOUR	MIN	(hr)	OUTPUT(MW)	REACTOR %	CEP	BFP
13-Apr-88	0		0.0				
	1		1.0				
	2		2.0				
	3		3.0				
	4		4.0				
	5		5.0				
	6		6.0				
	7		7.0				
	8		8.0				
	9		9.0				
	10		10.0				
	11		11.0				
	12		12.0	266.0	29.39	300	
	13		13.0			300	
	14		14.0	266.0	29.39	300	
	15		15.0			300	
	16		16.0	266.0	29.39	300	375
	17		17.0			300	
	18		18.0	613.1	67.75	685	850
	19		19.0			685	
	19	50.0	19.8	667.8	73.79	750	923
	20		20.0	667.8	73.79	750	
	21		21.0	667.8	73.79	750	
	22		22.0	667.8	73.79	750	
	23		23.0	667.8	73.79	750	
14-Apr-88	0		24.0	669.8	74.01	752	926
	1		25.0	669.8	74.01	752	
	2		26.0	669.8	74.01	752	
	3		27.0	669.8	74.01	752	
	4		28.0	669.8	74.01	752	
	5		29.0	669.8	74.01	752	
	6		30.0	669.8	74.01	752	
	7		31.0	669.8	74.01	752	
	8	28.0	32.5	669.8	74.01	752	
	9		33.0				
	10		34.0				
	11		35.0				
	12		36.0	662.0	73.15	740	
	13		37.0	662.0	73.15	740	
	14		38.0	662.0	73.15	740	
	15		39.0	662.0	73.15	740	
	16		40.0	662.0	73.15	740	
	17		41.0	662.0	73.15	740	
	18		42.0	662.0	73.15	740	
	19		43.0	662.0	73.15	740	
	20		44.0	662.0	73.15	740	915
	20	12.0	44.2	662.0	73.15	740	
	21		45.0	662.0	73.15	740	
	22		46.0	650.0	71.82	727	
	23		47.0	643.0	71.05	719	
15-Apr-88	0		48.0	635.0	70.17	650	803
	1		49.0	635.0	70.17	650	
	2		50.0	628.0	69.39		
	3		51.0	625.0	69.06		
	4		52.0	620.0	68.51		
	5		53.0	620.0	68.51		
	6		54.0	620.0	68.51		
	7		55.0	648.0	71.60	598	739
	8		56.0	692.0	76.46		
	9		57.0	770.0	85.08	905	1100
	9	30.0	57.5	795.0	87.85	907	1109
	10	30.0	58.5	821.0	90.72	918	1140
	11		59.0	822.0	90.83		
	12		60.0	821.0	90.72		
	13		61.0	820.0	90.61		
	14		62.0	818.0	90.39		
	15	30.0	63.5	800.0	88.40	894	1105
	16		64.0	700.0	77.35		
	17		65.0	400.0	44.20	447	552
	17	30.0	65.5	200.0	22.10	223	276
	18		66.0	200.0	22.10		
	19		67.0	200.0	22.10		
	20		68.0	0.0	0.00		
	21		69.0	0.0	0.00		
	22		70.0				
	23		71.0				
	24		72.0				

TABLE: A-11 Average System Flow During Sampling Runs During Shutdown
April 1988

Ref Time* (hr)	Reactor Power(%)	Flowrate (kg/s) CEP	Flowrate (kg/s) BFP	Sampling Run #	Avg Flowrate(kg/s) CEP	Avg Flowrate(kg/s) BFP
12.0	29.39	300	375			
14.0	29.39	300	375			
16.0	29.39	300	375			
18.0	67.75	685	850			
19.8	73.79	750	923			
24.0	74.01	752	926			
32.5	74.01	752	926			
33.0	0.00	0	0	Run 3	628.5	775.8
35.5	0.00	0	0			
36.0	73.15	740	915			
46.0	73.15	740	915	Run 4	583.5	721.4
47.0	73.15	740	915			
48.0	70.17	650	803			
55.0	71.60	598	739			
57.0	85.08	905	1100	Run 5	664.2	819.1
57.5	87.85	907	1109			
58.5	90.72	918	1140			
63.5	88.40	894	1105			
65.0	44.20	447	552			
65.5	22.10	223	276			
67.0	22.10	223	276			
68.0	0.00	0	0	Run 6	683.2	844.6

* Starting Time: April 13, 0:00 hr

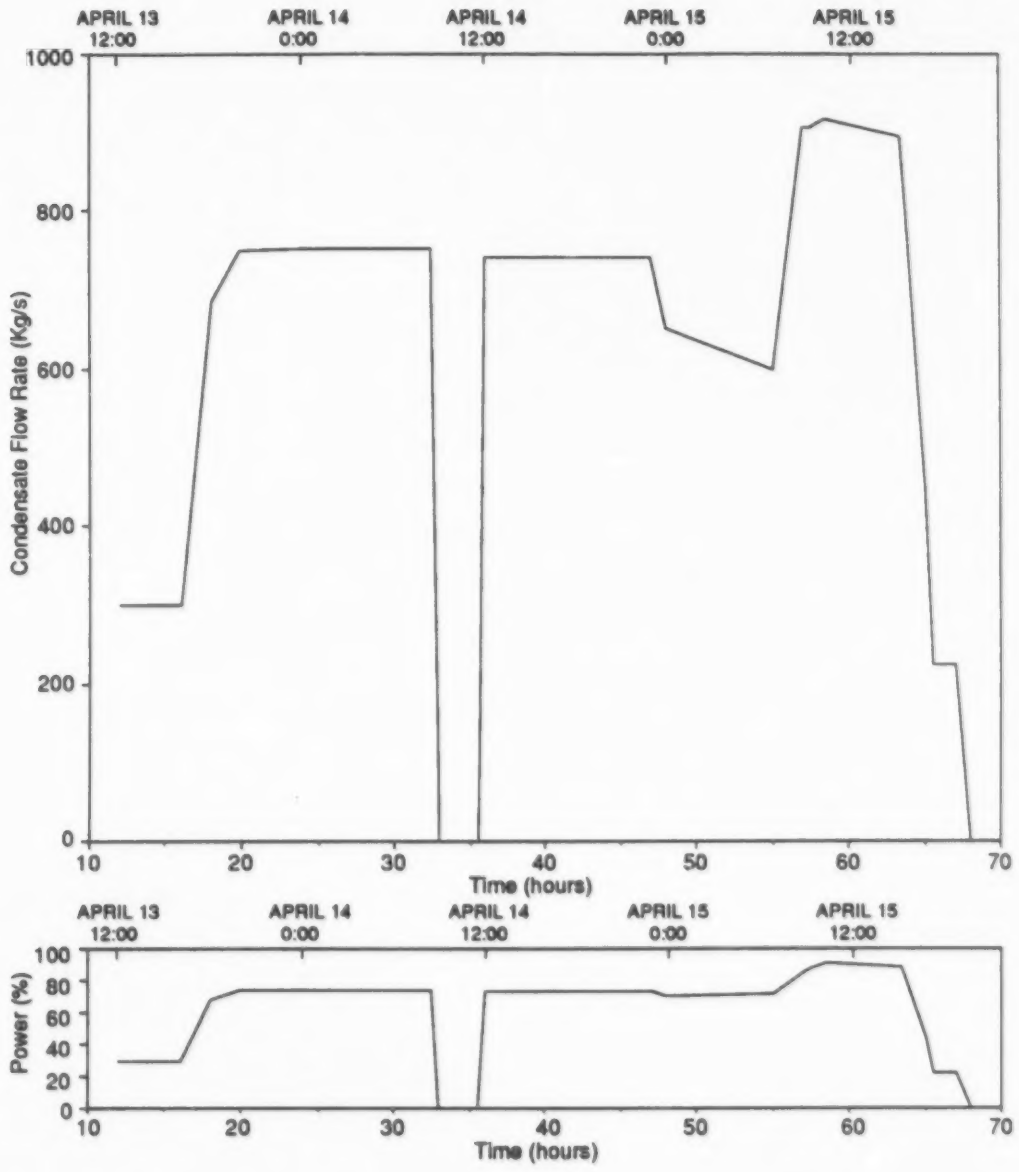


FIGURE A-1

SYSTEM FLOW CONDITIONS AT CONDENSATE EXTRACTION
PUMP DISCHARGE OF BRUCE B-7 DURING APRIL 1988 SHUTDOWN

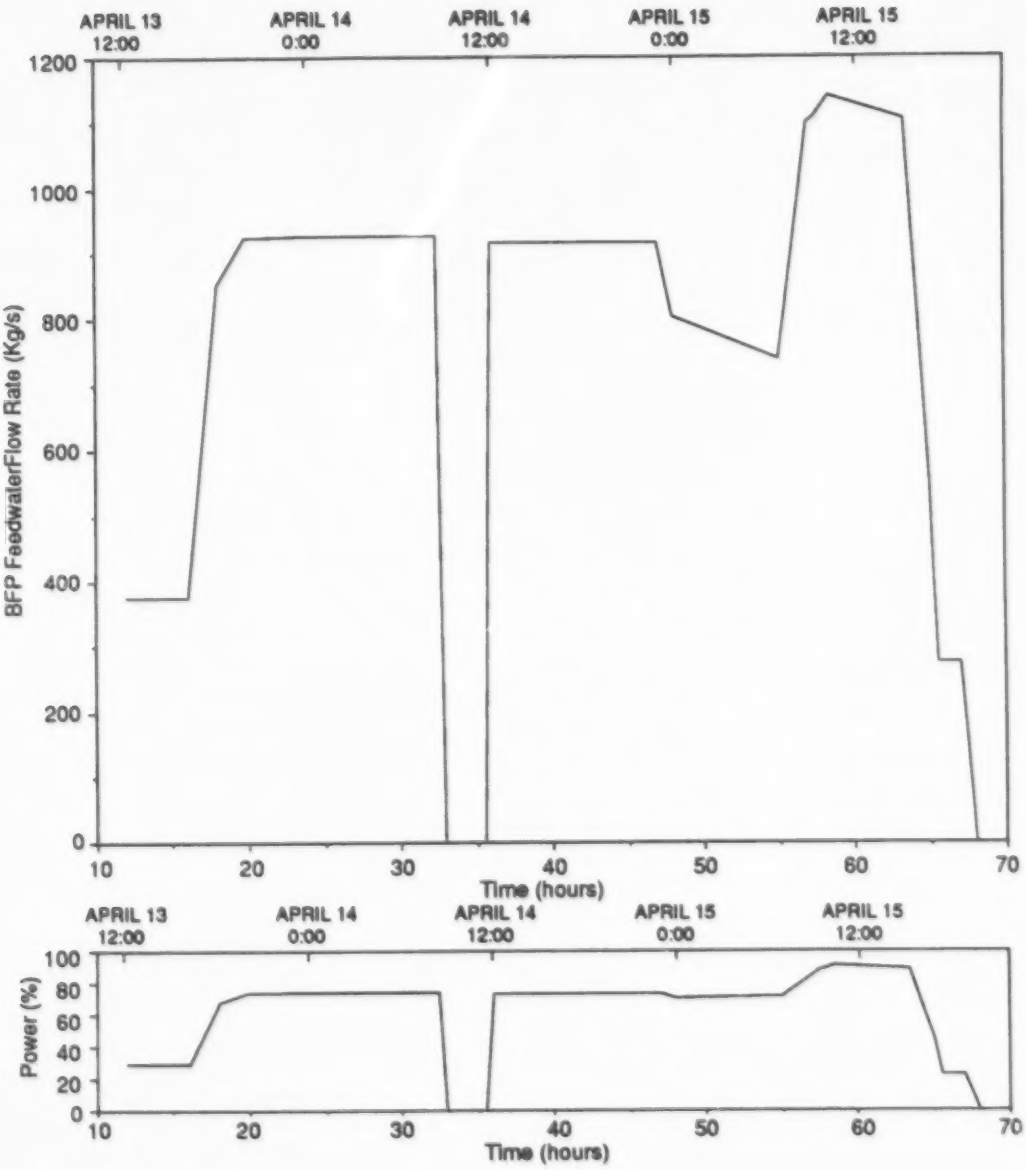


FIGURE A-2

SYSTEM FLOW CONDITIONS AT BOILER FEED PUMP
DISCHARGE OF BRUCE B-7 DURING APRIL 1988 SHUTDOWN

APPENDIX B

This appendix summarizes the June 1988 sampling data at Bruce-7 in the following tables:

B-1 Description of Filter Deposits Collected During June 1988 Startup

B-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Startup June 1988.

B-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Startup June 1988.

B-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Startup June 1988.

B-5 Total Element Concentration at Sampling Locations of Bruce-7 During Startup June 1988.

B-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During June 1988 Startup

B-7 Corrosion Product Concentration Profile at 8 Sampling Locations of Bruce-7 During June 1988 Startup.

B-8 Cumulative Transport of Corrosion Products at Bruce-7 During June 1988 Startup

B-9 Water Chemistry Data of Bruce-7 June 13 - 24, 1988

B-10 System Flow Data of Bruce-7 During June 1988 Startup

B-11 Average System Flow During Sampling Runs During Startup June 1988

List of Figures

B-I System Flow Conditions at Condensate Extraction Pump Discharge of Bruce-7 During June 1988 Startup

B-II System Flow Conditions at Boiler Feed Pump Discharge of Bruce-7 During June 1988 Startup

B-III System Flow Conditions at Reheater Drain of Bruce-7 During June 1988 Startup

B-IV System Flow Conditions at Steam Generator Inlet of Bruce-7 During June 1988 Startup

TABLE: B-1 Description of Filter Deposits Collected During June 1988 Startup

Sample Number	Sample Location	Description of Deposit on Filter		
		Colour	Loading	Remark
B88-06-R1-FC1	Cond Ext Pump			
B88-06-R1-FC2	HP Heater 5A	yellow brown	medium deposit	
B88-06-R1-FC3	Boiler Feed Pump			
B88-06-R1-FC4	SG Blow Off	yellow brown	medium deposit	
B88-06-R1-FC5	SG Feedwater			
B88-06-R1-FC6	PreHtr to SG 1-4			
B88-06-R1-FC7	Reheater Drain	brown	medium deposit	
B88-06-R1-FC8	Moist Sepr Drn			
B88-06-R2-FC1	Cond Ext Pump			
B88-06-R2-FC2	HP Heater 5A	yellow brown	light deposit	
B88-06-R2-FC3	Boiler Feed Pump			
B88-06-R2-FC4	SG Blow Off	brown yellow	light deposit	
B88-06-R2-FC5	SG Feedwater			
B88-06-R2-FC6	PreHtr to SG 1-4			
B88-06-R2-FC7	Reheater Drain	brown	medium deposit	
B88-06-R2-FC8	Moist Sepr Drn			
B88-06-R3-FC1	Cond Ext Pump			
B88-06-R3-FC2	HP Heater 5A	light brown	medium deposit	
B88-06-R3-FC3	Boiler Feed Pump			
B88-06-R3-FC4	SG Blow Off	brown	medium deposit	
B88-06-R3-FC5	SG Feedwater			
B88-06-R3-FC6	PreHtr to SG 1-4			
B88-06-R3-FC7	Reheater Drain	brown	medium deposit	
B88-06-R3-FC8	Moist Sepr Drn			
B88-06-R4-FC1	Cond Ext Pump			
B88-06-R4-FC2	HP Heater 5A	dark brown	medium deposit	few yellow particles
B88-06-R4-FC3	Boiler Feed Pump	brown	medium deposit	
B88-06-R4-FC4	SG Blow Off	brown	medium deposit	
B88-06-R4-FC5	SG Feedwater	reddish brown	heavy deposit	fine particles
B88-06-R4-FC6	PreHtr to SG 1-4			
B88-06-F4-FC7	Reheater Drain	brown	medium deposit	
B88-06-R4-FC8	Moist Sepr Drn	brown yellow	heavy deposit	fine particles
B88-06-R5-FC1	Cond Ext Pump			
B88-06-R5-FC2	HP Heater 5A	dark brown	medium deposit	few shiny particles
B88-06-R5-FC3	Boiler Feed Pump	brown	light deposit	
B88-06-R5-FC4	SG Blow Off	brown	light deposit	
B88-06-R5-FC5	SG Feedwater			
B88-06-R5-FC6	PreHtr to SG 1-4			
B88-06-R5-FC7	Reheater Drain			
B88-06-R5-FC8	Moist Sepr Drn			
B88-06-R6-FC1	Cond Ext Pump			
B88-06-R6-FC2	HP Heater 5A	dark brown	medium deposit	few dark particles
B88-06-R6-FC3	Boiler Feed Pump	brown	light deposit	
B88-06-R6-FC4	SG Blow Off	brown	light deposit	
B88-06-R6-FC5	SG Feedwater			
B88-06-R6-FC6	PreHtr to SG 1-4			
B88-06-R6-FC7	Reheater Drain			
B88-06-R6-FC8	Moist Sepr Drn			

TABLE: B-1 Description of Filter Deposits Collected During June 1988 Startup (cont'd)

Sample Number	Sample Location	Description of Deposit on Filter		
		Colour	Loading	Remark
B88-06-R7-FC1	Cond Ext Pump	greyish brown	stain	
B88-06-R7-FC2	HP Heater 5A	brown	heavy stain	few shiny particles
B88-06-R7-FC3	Boiler Feed Pump	brown	heavy stain	small brown particles
B88-06-R7-FC4	SG Blow Off	reddish brown	medium deposit	small brown particles
B88-06-R7-FC5	SG Feedwater			
B88-06-R7-FC6	PreHtr to SG 1-4	reddish brown	medium deposit	
B88-06-R7-FC7	Reheater Drain	yellowish brown	medium deposit	
B88-06-R7-FC8	Moist Sepr Drn			few yellow particles
B88-06-R8-FC1	Cond Ext Pump	dark greyish brown	medium deposit	
B88-06-R8-FC2	HP Heater 5A	brown	medium deposit	few black particles
B88-06-R8-FC3	Boiler Feed Pump	brown	heavy deposit	few shiny particles
B88-06-R8-FC4	SG Blow Off	reddish brown	medium deposit	few shiny particles
B88-06-R8-FC5	SG Feedwater			
B88-06-R8-FC6	PreHtr to SG 1-4	reddish brown	medium deposit	
B88-06-R8-FC7	Reheater Drain	brownish grey	medium deposit	
B88-06-R8-FC8	Moist Sepr Drn			few black particles
B88-06-R9-FC1	Cond Ext Pump	dark grey	medium deposit	few black particles
B88-06-R9-FC2	HP Heater 5A	brownish red	medium deposit	
B88-06-R9-FC3	Boiler Feed Pump	brown	medium deposit	few black particles
B88-06-R9-FC4	SG Blow Off	dark brown	medium deposit	
B88-06-R9-FC5	SG Feedwater			black particles
B88-06-R9-FC6	PreHtr to SG 1-4	black brown	heavy deposit	
B88-06-R9-FC7	Reheater Drain	brown	medium deposit	few shiny particles
B88-06-R9-FC8	Moist Sepr Drn	yellowish brown	light deposit	black particles
B88-06-R10-FC1	Cond Ext Pump	greyish brown	light deposit	few black particles
B88-06-R10-FC2	HP Heater 5A	dark brown	light deposit	
B88-06-R10-FC3	Boiler Feed Pump	dark brown	light deposit	fewblack particles
B88-06-R10-FC4	SG Blow Off	reddish brown	medium deposit	
B88-06-R10-FC5	SG Feedwater			
B88-06-R10-FC6	PreHtr to SG 1-4	reddish brown	medium deposit	
B88-06-R10-FC7	Reheater Drain	dark brown	v. light deposit	
B88-06-R10-FC8	Moist Sepr Drn	brownish yellow	v. light deposit	few brown particles
B88-06-R11-FC1	Cond Ext Pump	greyish brown	light deposit	few black particles
B88-06-R11-FC2	HP Heater 5A	dark brown	light deposit	
B88-06-R11-FC3	Boiler Feed Pump	dark brown	light deposit	few black particles
B88-06-R11-FC4	SG Blow Off	reddish brown	medium deposit	fine particles
B88-06-R11-FC5	SG Feedwater			
B88-06-R11-FC6	PreHtr to SG 1-4	reddish brown	medium deposit	
B88-06-R11-FC7	Reheater Drain	dark brown	v. light deposit	
B88-06-R11-FC8	Moist Sepr Drn	brownish yellow	v. light deposit	few brown particles
B88-06-R12-FC1	Cond Ext Pump	dark brown	heavy deposit	few black particles
B88-06-R12-FC2	HP Heater 5A	dark brown	medium deposit	
B88-06-R12-FC3	Boiler Feed Pump	dark brown	medium deposit	few black particles
B88-06-R12-FC4	SG Blow Off	reddish brown	very heavy deposit	
B88-06-R12-FC5	SG Feedwater			
B88-06-R12-FC6	PreHtr to SG 1-4	brown	medium deposit	
B88-06-R12-FC7	Reheater Drain	brownish black	medium deposit	
B88-06-R12-FC8	Moist Sepr Drn	yellowish brown	medium deposit	few black particles
				few black particles

TABLE: B-1 Description of Filter Deposits Collected During June 1988 Startup (cont'd)

Sample Number	Sample Location	Description of Deposit on Filter		
		Colour	Loading	Remark
B88-06-R13-FC1	Cond Ext Pump	brown	medium deposit	
B88-06-R13-FC2	HP Heater 5A	brown	light deposit	
B88-06-R13-FC3	Boiler Feed Pump	reddish brown	medium deposit	
B88-06-R13-FC4	SG Blow Off	reddish brown	medium deposit	
B88-06-R13-FC5	SG Feedwater			
B88-06-R13-FC6	PreHtr to SG 1-4	brown	medium deposit	brown particles
B88-06-R13-FC7	Reheater Drain	brownish red	light deposit	
B88-06-R13-FC8	Moist Sepr Drn	yellow brown	light uneven stain	
B88-06-R14-FC1	Cond Ext Pump	yellow brown	light deposit	
B88-06-R14-FC2	HP Heater 5A	brown	light deposit	
B88-06-R14-FC3	Boiler Feed Pump	brown	light deposit	
B88-06-R14-FC4	SG Blow Off	reddish brown	light deposit	
B88-06-R14-FC5	SG Feedwater			
B88-06-R14-FC6	PreHtr to SG 1-4	yellowish brown	light uneven stain	
B88-06-R14-FC7	Reheater Drain	no sample		
B88-06-R14-FC8	Moist Sepr Drn			few small brown particles
B88-06-R15-FC1	Cond Ext Pump	light brown	medium deposit	
B88-06-R15-FC2	HP Heater 5A	yellowish brown	medium deposit	
B88-06-R15-FC3	Boiler Feed Pump	brown	medium deposit	
B88-06-R15-FC4	SG Blow Off	reddish brown	heavy	
B88-06-R15-FC5	SG Feedwater			
B88-06-R15-FC6	PreHtr to SG 1-4	reddish brown	medium deposit	
B88-06-R15-FC7	Reheater Drain	dark purple	light stain	
B88-06-R15-FC8	Moist Sepr Drn	no sample		
B88-06-R16-FC1	Cond Ext Pump	dark brown	heavy deposit	few small brown particles
B88-06-R16-FC2	HP Heater 5A	brown	light stain	
B88-06-R16-FC3	Boiler Feed Pump	dark brown	medium deposit	
B88-06-R16-FC4	SG Blow Off	reddish brown	medium deposit	
B88-06-R16-FC5	SG Feedwater			
B88-06-R16-FC6	PreHtr to SG 1-4	reddish brown	medium deposit	
B88-06-R16-FC7	Reheater Drain	yellowish brown	light stain	
B88-06-R16-FC8	Moist Sepr Drn	brown	light stain	
B88-06-R17-FC1	Cond Ext Pump	black	heavy deposit	few black particles
B88-06-R17-FC2	HP Heater 5A	dark brown	medium deposit	
B88-06-R17-FC3	Boiler Feed Pump	dark brown	medium deposit	
B88-06-R17-FC4	SG Blow Off	reddish brown	medium deposit	
B88-06-R17-FC5	SG Feedwater			
B88-06-R17-FC6	PreHtr to SG 1-4	reddish brown	light uneven deposit	
B88-06-R17-FC7	Reheater Drain	dark brown	light stain	
B88-06-R17-FC8	Moist Sepr Drn	reddish brown	heavy stain	few brown particles few black flakes
B88-06-R18-FC1	Cond Ext Pump	green brown	light stain	
B88-06-R18-FC2	HP Heater 5A	dark brown	light stain	few black particles
B88-06-R18-FC3	Boiler Feed Pump	brown	light stain	few dark particles
B88-06-R18-FC4	SG Blow Off	reddish brown	medium deposit	few dark particles
B88-06-R18-FC5	SG Feedwater			
B88-06-R18-FC6	PreHtr to SG 1-4	reddish brown	light stain	grid pattern
B88-06-R18-FC7	Reheater Drain	dark brown	light stain	few dark particles
B88-06-R18-FC8	Moist Sepr Drn	brown	heavy deposit	few coarse particles

TABLE: B-1 Description of Filter Deposits Collected During June 1988 Startup (cont'd)

Sample Number	Sample Location	Description of Deposit on Filter		
		Colour	Loading	Remark
B88-06-R19-FC1	Cond Ext Pump	green brown	light deposit	
B88-06-R19-FC2	HP Heater 5A	reddish brown	medium deposit	
B88-06-R19-FC3	Boiler Feed Pump	brown	light stain	
B88-06-R19-FC4	SG Blow Off	reddish brown	heavy deposit	few dark particles
B88-06-R19-FC5	SG Feedwater			
B88-06-R19-FC6	PreHtr to SG 1-4	dark purple	light uneven stain	uneven
B88-06-R19-FC7	Reheater Drain			few dark particles
B88-06-R19-FC8	Moist Sepr Drn	yellow brown	light deposit	coarse particles
B88-06-R20-FC1	Cond Ext Pump	green brown	light uneven stain	
B88-06-R20-FC2	HP Heater 5A	reddish brown	light uneven stain	
B88-06-R20-FC3	Boiler Feed Pump	reddish brown	light uneven stain	
B88-06-R20-FC4	SG Blow Off	dark brown	medium deposit	
B88-06-R20-FC5	SG Feedwater			
B88-06-R20-FC6	PreHtr to SG 1-4	light purple	light uneven stain	
B88-06-R20-FC7	Reheater Drain			
B88-06-R20-FC8	Moist Sepr Drn	yellow brown	light stain	few black particles
B88-06-R21-FC1	Cond Ext Pump	green brown	light stain	few black particles
B88-06-R21-FC2	HP Heater 5A	reddish brown	light stain	uneven
B88-06-R21-FC3	Boiler Feed Pump	reddish brown	light stain	uneven
B88-06-R21-FC4	SG Blow Off	dark brown	medium deposit	uneven
B88-06-R21-FC5	SG Feedwater			
B88-06-R21-FC6	PreHtr to SG 1-4	light purple	light uneven stain	
B88-06-R21-FC7	Reheater Drain			
B88-06-R21-FC8	Moist Sepr Drn	yellow brown	light stain	few black particles
				few black particles

TABLE: B-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Startup June, 1988

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol(L)	Particle Wt.(mg)	Particle conc.(ug/L
B88-06-R1-FC1	Cond Ext Pump	JUNE 13/88	21:40-13:06	15.4	16.09	10.50	652.58
B88-06-R1-FC2	HP Heater 5A	JUNE 13/88	21:40-13:06	15.4	0.00	0.00	
B88-06-R1-FC3	Boiler Feed Pump	JUNE 13/88	21:40-13:06	15.4	22.35	14.20	635.35
B88-06-R1-FC4	SG Blow Off	JUNE 13/88	21:40-13:06	15.4	0.00	0.00	
B88-06-R1-FC5	SG Feedwater	JUNE 13/88	21:40-13:06	15.4	0.00	0.00	
B88-06-R1-FC6	PreHtr to SG 1-4	JUNE 13/88	21:40-13:06	15.4	9.82	17.50	1782.08
B88-06-R1-FC7	Reheater Drain	JUNE 13/88	21:40-13:06	15.4	0.00	0.00	
B88-06-R1-FC8	Moist Sepr Drn	JUNE 13/88	21:40-13:06	15.4	0.00	0.00	
B88-06-R2-FC1	Cond Ext Pump	JUNE 14/88	13:15-15:05	1.8	9.64	3.60	373.44
B88-06-R2-FC2	HP Heater 5A	JUNE 14/88	13:15-15:05	1.8	0.00	0.00	
B88-06-R2-FC3	Boiler Feed Pump	JUNE 14/88	13:15-15:05	1.8	22.00	4.10	186.36
B88-06-R2-FC4	SG Blow Off	JUNE 14/88	13:15-15:05	1.8	0.00	0.00	
B88-06-R2-FC5	SG Feedwater	JUNE 14/88	13:15-15:05	1.8	0.00	0.00	
B88-06-R2-FC6	PreHtr to SG 1-4	JUNE 14/88	13:15-15:05	1.8	5.98	7.80	1304.35
B88-06-R2-FC7	Reheater Drain	JUNE 14/88	13:15-15:05	1.8	0.00	0.00	
B88-06-R2-FC8	Moist Sepr Drn	JUNE 14/88	13:15-15:05	1.8	0.00	0.00	
B88-06-R3-FC1	Cond Ext Pump	JUNE 14/88	15:15-20:35	5.33	12.06	4.50	373.13
B88-06-R3-FC2	HP Heater 5A	JUNE 14/88	15:15-20:35	5.33	0.00	0.00	
B88-06-R3-FC3	Boiler Feed Pump	JUNE 14/88	15:15-20:35	5.33	27.01	5.50	203.63
B88-06-R3-FC4	SG Blow Off	JUNE 14/88	15:15-20:35	5.33	0.00	0.00	
B88-06-R3-FC5	SG Feedwater	JUNE 14/88	15:15-20:35	5.33	0.00	0.00	
B88-06-R3-FC6	PreHtr to SG 1-4	JUNE 14/88	15:15-20:35	5.33	4.25	4.30	1011.76
B88-06-R3-FC7	Reheater Drain	JUNE 14/88	15:15-20:35	5.33	0.00	0.00	
B88-06-R3-FC8	Moist Sepr Drn	JUNE 14/88	15:15-20:35	5.33	0.00	0.00	
B88-06-R4-FC1	Cond Ext Pump	JUNE 17/88	8:50-10:40	1.8	33.48	19.50	582.44
B88-06-R4-FC2	HP Heater 5A	JUNE 17/88	8:50-10:40	1.8	28.62	27.90	974.84
B88-06-R4-FC3	Boiler Feed Pump	JUNE 17/88	8:50-10:40	1.8	22.66	10.40	458.96
B88-06-R4-FC4	SG Blow Off	JUNE 17/88	8:50-10:40	1.8	40.65	16.00	393.60
B88-06-R4-FC5	SG Feedwater	JUNE 17/88	8:50-10:40	1.8	0.01	0.01	1000.00
B88-06-R4-FC6	PreHtr to SG 1-4	JUNE 17/88	8:50-10:40	1.8	40.37	4.70	116.42
B88-06-F4-FC7	Reheater Drain	JUNE 17/88	8:50-10:40	1.8	10.00	32.40	3240.00
B88-06-R4-FC8	Moist Sepr Drn	JUNE 17/88	8:50-10:40	1.8	0.00	0.00	
B88-06-R5-FC1	Cond Ext Pump	JUNE 17/88	11:00-12:30	1.5	25.38	14.60	575.26
B88-06-R5-FC2	HP Heater 5A	JUNE 17/88	11:00-12:30	1.5	29.97	12.70	423.76
B88-06-R5-FC3	Boiler Feed Pump	JUNE 17/88	11:00-12:30	1.5	32.80	15.00	457.32
B88-06-R5-FC4	SG Blow Off	JUNE 17/88	11:00-				384.62
B88-06-R5-FC5	SG Feedwater	JUNE 17/88	11:00-				
B88-06-R5-FC6	PreHtr to SG 1-4	JUNE 17/88	11:00-				258.89
B88-06-R5-FC7	Reheater Drain	JUNE 17/88	11:00-				1636.23
B88-06-R5-FC8	Moist Sepr Drn	JUNE 17/88	11:00-				

TABLE: B-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol(L)	Particle Wt.(mg)	Particle conc.(ug/L
B88-06-R6-FC1	Cond Ext Pump	JUNE 17/88	12:35-13:35	1.0	20.35	6.20	304.67
B88-06-R6-FC2	HP Heater 5A	JUNE 17/88	12:35-13:35	1.0	20.72	5.00	241.31
B88-06-R6-FC3	Boiler Feed Pump	JUNE 17/88	12:35-13:35	1.0	19.31	5.30	274.47
B88-06-R6-FC4	SG Blow Off	JUNE 17/88	11:00-				384.62
B88-06-R6-FC5	SG Feedwater	JUNE 17/88	11:00-				
B88-06-R6-FC6	PreHtr to SG 1-4	JUNE 17/88	11:00-				258.89
B88-06-R6-FC7	Reheater Drain	JUNE 17/88	11:00-				1636.23
B88-06-R6-FC8	Moist Sepr Drn	JUNE 17/88	11:00-				
B88-06-R7-FC1	Cond Ext Pump	JUNE 17/88	13:40-14:55	1.25	23.22	4.50	193.80
B88-06-R7-FC2	HP Heater 5A	JUNE 17/88	13:40-14:55	1.25	28.28	4.70	166.20
B88-06-R7-FC3	Boiler Feed Pump	JUNE 17/88	13:40-14:55	1.25	21.93	4.40	200.64
B88-06-R7-FC4	SG Blow Off	JUNE 17/88	11:00-14:55	3.8	85.80	33.00	384.62
B88-06-R7-FC5	SG Feedwater	JUNE 17/88	11:00-14:55	3.8	0.00	0.01	
B88-06-R7-FC6	PreHtr to SG 1-4	JUNE 17/88	11:00-14:55	3.8	90.00	23.30	258.89
B88-06-R7-FC7	Reheater Drain	JUNE 17/88	11:00-14:55	3.8	13.14	21.50	1636.23
B88-06-R7-FC8	Moist Sepr Drn	JUNE 17/88	11:00-14:55	3.8	0.00	0.00	
B88-06-R8-FC1	Cond Ext Pump	JUNE 17/88	15:15-19:50	4.58	80.31	38.50	479.39
B88-06-R8-FC2	HP Heater 5A	JUNE 17/88	15:15-19:50	4.58	79.35	47.80	602.39
B88-06-R8-FC3	Boiler Feed Pump	JUNE 17/88	15:15-19:50	4.58	79.87	55.30	692.38
B88-06-R8-FC4	SG Blow Off	JUNE 17/88	15:15-19:50	4.58	108.90	52.40	481.18
B88-06-R8-FC5	SG Feedwater	JUNE 17/88	15:15-19:50	4.58	0.00	0.00	
B88-06-R8-FC6	PreHtr to SG 1-4	JUNE 17/88	15:15-19:50	4.58	104.44	27.20	260.44
B88-06-R8-FC7	Reheater Drain	JUNE 17/88	15:15-19:50	4.58	68.00	525.30	7725.00
B88-06-R8-FC8	Moist Sepr Drn	JUNE 17/88	15:15-19:50	4.58	0.20	11.50	57500.00
B88-06-R9-FC1	Cond Ext Pump	JUNE 17-18/88	20:35-8:35	12.0	190.52	14.30	75.06
B88-06-R9-FC2	HP Heater 5A	JUNE 17-18/88	20:35-8:35	12.0	284.73	23.30	81.83
B88-06-R9-FC3	Boiler Feed Pump	JUNE 17-18/88	20:35-8:35	12.0	262.52	35.70	135.99
B88-06-R9-FC4	SG Blow Off	JUNE 17-18/88	20:35-8:35	12.0	281.11	211.30	751.66
B88-06-R9-FC5	SG Feedwater	JUNE 17-18/88	20:35-8:35	12.0	0.00	0.00	
B88-06-R9-FC6	PreHtr to SG 1-4	JUNE 17-18/88	20:35-8:35	12.0	316.79	22.60	71.34
B88-06-R9-FC7	Reheater Drain	JUNE 17-18/88	20:35-8:35	12.0	228.76	159.20	695.93
B88-06-R9-FC8	Moist Sepr Drn	JUNE 17-18/88	20:35-8:35	12.0	10.00	13.60	1360.00
B88-06-R10-FC1	Cond Ext Pump	JUNE 18/88	09:30-21:10	11.66	232.87	7.00	30.06
B88-06-R10-FC2	HP Heater 5A	JUNE 18/88	09:30-21:10	11.66	293.32	4.60	15.68
B88-06-R10-FC3	Boiler Feed Pump	JUNE 18/88	09:30-21:10	11.66	334.80	9.70	28.97
B88-06-R10-FC4	SG Blow Off	JUNE 18/88	09:30-21:10	11.66	229.22	114.30	498.65
B88-06-R10-FC5	SG Feedwater	JUNE 18/88	09:30-21:10	11.66	0.00	0.00	
B88-06-R10-FC6	PreHtr to SG 1-4	JUNE 18/88	09:30-21:10	11.66	250.25	1.80	7.19
B88-06-R10-FC7	Reheater Drain	JUNE 18/88	09:30-21:10	11.66	264.89	2.30	8.68
B88-06-R10-FC8	Moist Sepr Drn	JUNE 18/88	09:30-21:10	11.66	76.14	3.50	45.97

TABLE: B-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol(L)	Particle Wt.(mg)	Particle conc.(ug/L
B88-06-R11-FC1	Cond Ext Pump	JUNE 18-19/88	22:00-09:50	11.83	218.45	4.00	18.31
B88-06-R11-FC2	HP Heater 5A	JUNE 18-19/88	22:00-09:50	11.83	266.79	3.70	13.87
B88-06-R11-FC3	Boiler Feed Pump	JUNE 18-19/88	22:00-09:50	11.83	226.00	5.40	23.89
B88-06-R11-FC4	SG Blow Off	JUNE 18-19/88	22:00-09:50	11.83	319.63	142.50	445.83
B88-06-R11-FC5	SG Feedwater	JUNE 18-19/88	22:00-09:50	11.83	0.03	0.00	0.00
B88-06-R11-FC6	PreHtr to SG 1-4	JUNE 18-19/88	22:00-09:50	11.83	275.08	1.20	4.36
B88-06-R11-FC7	Reheater Drain	JUNE 18-19/88	22:00-09:50	11.83	274.08	2.80	10.22
B88-06-R11-FC8	Moist Sepr Drn	JUNE 18-19/88	22:00-09:50	11.83	9.73	3.80	390.54
B88-06-R12-FC1	Cond Ext Pump	JUNE 19/88	11:30-21:02	11.5	147.14	56.60	384.67
B88-06-R12-FC2	HP Heater 5A	JUNE 19/88	11:30-21:02	11.5	151.60	40.60	267.81
B88-06-R12-FC3	Boiler Feed Pump	JUNE 19/88	11:30-21:02	11.5	147.11	39.40	267.83
B88-06-R12-FC4	SG Blow Off	JUNE 19/88	11:30-21:02	11.5	230.23	815.50	3542.11
B88-06-R12-FC5	SG Feedwater	JUNE 19/88	11:30-21:02	11.5	0.00	0.00	
B88-06-R12-FC6	PreHtr to SG 1-4	JUNE 19/88	11:30-21:02	11.5	245.63	68.40	278.47
B88-06-R12-FC7	Reheater Drain	JUNE 19/88	11:30-21:02	11.5	279.25	289.10	1035.27
B88-06-R12-FC8	Moist Sepr Drn	JUNE 19/88	11:30-21:02	11.5	55.06	278.80	5063.57
B88-06-R13-FC1	Cond Ext Pump	JUNE 19-20/88	22:05-08:45	10.66	38.11	9.20	241.41
B88-06-R13-FC2	HP Heater 5A	JUNE 19-20/88	22:05-08:45	10.66	132.26	5.60	42.34
B88-06-R13-FC3	Boiler Feed Pump	JUNE 19-20/88	22:05-08:45	10.66	76.88	7.20	93.65
B88-06-R13-FC4	SG Blow Off	JUNE 19-20/88	22:05-08:45	10.66	365.05	74.70	204.63
B88-06-R13-FC5	SG Feedwater	JUNE 19-20/88	22:05-08:45	10.66	0.00	0.00	
B88-06-R13-FC6	PreHtr to SG 1-4	JUNE 19-20/88	22:05-08:45	10.66	237.19	1.90	8.01
B88-06-R13-FC7	Reheater Drain	JUNE 19-20/88	22:05-08:45	10.66	198.52	8.10	40.80
B88-06-R13-FC8	Moist Sepr Drn	JUNE 19-20/88	22:05-08:45	10.66	0.00	3.50	
B88-06-R14-FC1	Cond Ext Pump	JUNE 20/88	10:00-15:45	5.75	3.36	2.50	744.05
B88-06-R14-FC2	HP Heater 5A	JUNE 20/88	10:00-15:45	5.75	11.31	3.00	265.25
B88-06-R14-FC3	Boiler Feed Pump	JUNE 20/88	10:00-15:45	5.75	12.30	2.60	211.38
B88-06-R14-FC4	SG Blow Off	JUNE 20/88	10:00-15:45	5.75	118.95	1.70	14.29
B88-06-R14-FC5	SG Feedwater	JUNE 20/88	10:00-15:45	5.75	0.00	0.00	
B88-06-R14-FC6	PreHtr to SG 1-4	JUNE 20/88	10:00-15:45	5.75	101.62	3.40	33.46
B88-06-R14-FC7	Reheater Drain	JUNE 20/88	10:00-15:45	5.75	48.39	0.50	10.33
B88-06-R14-FC8	Moist Sepr Drn	JUNE 20/88	10:00-15:45	5.75	0.00	0.00	
B88-06-R15-FC1	Cond Ext Pump	JUNE 20-21/88	16:05-08:40	16.53	6.16	3.10	503.25
B88-06-R15-FC2	HP Heater 5A	JUNE 20-21/88	16:05-08:40	16.53	4.70	2.30	489.36
B88-06-R15-FC3	Boiler Feed Pump	JUNE 20-21/88	16:05-08:40	16.53	15.19	3.20	210.66
B88-06-R15-FC4	SG Blow Off	JUNE 20-21/88	16:05-08:40	16.53	214.68	110.90	516.58
B88-06-R15-FC5	SG Feedwater	JUNE 20-21/88	16:05-08:40	16.53	0.00	0.00	
B88-06-R15-FC6	PreHtr to SG 1-4	JUNE 20-21/88	16:05-08:40	16.53	200.39	2.90	14.47
B88-06-R15-FC7	Reheater Drain	JUNE 20-21/88	16:05-08:40	16.53	139.77	0.60	4.29
B88-06-R15-FC8	Moist Sepr Drn	JUNE 20-21/88	16:05-08:40	16.53	0.00	0.00	

TABLE: B-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol(L)	Particle Wt.(mg)	Particle conc.(ug/L
B88-06-R16-FC1	Cond Ext Pump	JUNE 21/88	13:20-19:20	6.0	111.36	10.40	93.39
B88-06-R16-FC2	HP Heater 5A	JUNE 21/88	13:20-19:20	6.0	84.75	4.40	51.92
B88-06-R16-FC3	Boiler Feed Pump	JUNE 21/88	13:20-19:20	6.0	96.46	5.20	53.91
B88-06-R16-FC4	SG Blow Off	JUNE 21/88	13:20-19:20	6.0	126.89	7.10	55.95
B88-06-R16-FC5	SG Feedwater	JUNE 21/88	13:20-19:20	6.0	0.00	0.00	
B88-06-R16-FC6	PreHtr to SG 1-4	JUNE 21/88	13:20-19:20	6.0	113.54	1.80	15.85
B88-06-R16-FC7	Reheater Drain	JUNE 21/88	13:20-19:20	6.0	62.12	29.10	468.45
B88-06-R16-FC8	Moist Sepr Drn	JUNE 21/88	13:20-19:20	6.0	0.14	7.40	52857.14
B88-06-R17-FC1	Cond Ext Pump	JUNE 21-22/88	20:05-08:15	12.16	230.93	11.90	51.53
B88-06-R17-FC2	HP Heater 5A	JUNE 21-22/88	20:05-08:15	12.16	218.58	8.50	38.89
B88-06-R17-FC3	Boiler Feed Pump	JUNE 21-22/88	20:05-08:15	12.16	441.69	7.00	15.85
B88-06-R17-FC4	SG Blow Off	JUNE 21-22/88	20:05-08:15	12.16	407.35	27.00	66.28
B88-06-R17-FC5	SG Feedwater	JUNE 21-22/88	20:05-08:15	12.16	0.00	0.00	
B88-06-R17-FC6	PreHtr to SG 1-4	JUNE 21-22/88	20:05-08:15	12.16	260.65	2.60	9.98
B88-06-R17-FC7	Reheater Drain	JUNE 21-22/88	20:05-08:15	12.16	253.17	91.60	361.81
B88-06-R17-FC8	Moist Sepr Drn	JUNE 21-22/88	20:05-08:15	12.16	32.19	3.70	114.94
B88-06-R18-FC1	Cond Ext Pump	JUNE 22/88	09:30-19:00	8.5	161.89	5.40	33.36
B88-06-R18-FC2	HP Heater 5A	JUNE 22/88	09:30-19:00	8.5	166.45	4.40	26.43
B88-06-R18-FC3	Boiler Feed Pump	JUNE 22/88	09:30-19:00	8.5	164.78	3.80	23.06
B88-06-R18-FC4	SG Blow Off	JUNE 22/88	09:30-19:00	8.5	216.07	12.70	58.78
B88-06-R18-FC5	SG Feedwater	JUNE 22/88	09:30-19:00	8.5	0.00	0.00	
B88-06-R18-FC6	PreHtr to SG 1-4	JUNE 22/88	09:30-19:00	8.5	240.69	4.40	18.28
B88-06-R18-FC7	Reheater Drain	JUNE 22/88	09:30-19:00	8.5	247.32	33.80	136.67
B88-06-R18-FC8	Moist Sepr Drn	JUNE 22/88	09:30-19:00	8.5	138.13	27.90	201.98
B88-06-R19-FC1	Cond Ext Pump	JUNE 22-23/88	19:30-08:30	13.0	296.66	5.50	18.54
B88-06-R19-FC2	HP Heater 5A	JUNE 22-23/88	19:30-08:30	13.0	381.57	10.80	28.30
B88-06-R19-FC3	Boiler Feed Pump	JUNE 22-23/88	19:30-08:30	13.0	188.96	4.10	21.70
B88-06-R19-FC4	SG Blow Off	JUNE 22-23/88	19:30-08:30	13.0	133.32	3386.00	25397.54
B88-06-R19-FC5	SG Feedwater	JUNE 22-23/88	19:30-08:30	13.0	0.00	0.00	
B88-06-R19-FC6	PreHtr to SG 1-4	JUNE 22-23/88	19:30-08:30	13.0	263.49	3.80	14.42
B88-06-R19-FC7	Reheater Drain	JUNE 22-23/88	19:30-08:30	13.0	272.18	5.30	19.47
B88-06-R19-FC8	Moist Sepr Drn	JUNE 22-23/88	19:30-08:30	13.0	177.94	17.60	98.91
B88-06-R20-FC1	Cond Ext Pump	JUNE 23/88	10:30-15:15	4.75	99.15	1.20	12.10
B88-06-R20-FC2	HP Heater 5A	JUNE 23/88	10:30-15:15	4.75	114.19	2.10	18.39
B88-06-R20-FC3	Boiler Feed Pump	JUNE 23/88	10:30-15:15	4.75	94.89	1.90	20.02
B88-06-R20-FC4	SG Blow Off	JUNE 23/88	10:30-15:15	4.75	98.72	17.90	181.32
B88-06-R20-FC5	SG Feedwater	JUNE 23/88	10:30-15:15	4.75	0.00	0.00	
B88-06-R20-FC6	PreHtr to SG 1-4	JUNE 23/88	10:30-15:15	4.75	104.45	0.60	5.74
B88-06-R20-FC7	Reheater Drain	JUNE 23/88	10:30-15:15	4.75	98.00	1.40	14.29
B88-06-R20-FC8	Moist Sepr Drn	JUNE 23/88	10:30-15:15	4.75	129.66	12.70	97.95

TABLE: B-2 Sampling Conditions and Particulate Concentrations in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Date	Time of Day	Duration (Hours)	Sample Vol(L)	Particle Wt.(mg)	Particle conc.(ug/L
B88-06-R21-FC1	Cond Ext Pump	JUNE 23-24/88	16:00-09:00	17.0	227.90	2.00	8.78
B88-06-R21-FC2	HP Heater 5A	JUNE 23-24/88	16:00-09:00	17.0	315.89	3.00	9.50
B88-06-R21-FC3	Boiler Feed Pump	JUNE 23-24/88	16:00-09:00	17.0	236.82	3.60	15.20
B88-06-R21-FC4	SG Blow Off	JUNE 23-24/88	16:00-09:00	17.0	311.54	9.10	29.21
B88-06-R21-FC5	SG Feedwater	JUNE 23-24/88	16:00-09:00	17.0	0.00	0.00	
B88-06-R21-FC6	PreHtr to SG 1-4	JUNE 23-24/88	16:00-09:00	17.0	276.14	3.80	13.76
B88-06-R21-FC7	Reheater Drain	JUNE 23-24/88	16:00-09:00	17.0	285.82	1.10	3.85
B88-06-R21-FC8	Moist Sepr Drn	JUNE 23-24/88	16:00-09:00	17.0	448.37	18.40	41.04

TABLE: B-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Startup June 1988.

Sample Number	Sample Location	Wt of Element in Particulate (ug/Fltr)					Filterable Element Concentration (ug/L)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R1-FC1	Cond Ext Pump	22.00	5620	3.50	83.00	17.00	1.37	349.29	0.22	5.16	1.06
B88-06-R1-FC2	HP Heater 5A										
B88-06-R1-FC3	Boiler Feed Pump	20.00	7700	3.00	83.00	18.00	0.89	344.52	0.13	3.71	0.81
B88-06-R1-FC4	SG Blow Off										
B88-06-R1-FC5	SG Feedwater										
B88-06-R1-FC6	PreHtr to SG 1-4	168.00	10900	12.00	63.00	36.00	17.11	1109.98	1.22	6.42	3.67
B88-06-R1-FC7	Reheater Drain										
B88-06-R1-FC8	Moist Sepr Drn										
B88-06-R2-FC1	Cond Ext Pump	3.00	2040	0.00	33.00	1.40	0.31	211.62	0.00	3.42	0.15
B88-06-R2-FC2	HP Heater 5A										
B88-06-R2-FC3	Boiler Feed Pump	4.00	2500	0.00	40.00	1.60	0.18	113.64	0.00	1.82	0.07
B88-06-R2-FC4	SG Blow Off										
B88-06-R2-FC5	SG Feedwater										
B88-06-R2-FC6	PreHtr to SG 1-4	30.00	4370	0.00	40.00	7.80	5.02	730.77	0.00	6.69	1.30
B88-06-R2-FC7	Reheater Drain										
B88-06-R2-FC8	Moist Sepr Drn										
B88-06-R3-FC1	Cond Ext Pump	1.70	1930	0.00	30.00	1.00	0.14	160.03	0.00	2.49	0.08
B88-06-R3-FC2	HP Heater 5A										
B88-06-R3-FC3	Boiler Feed Pump	3.00	2840	0.00	48.00	1.00	0.11	105.15	0.00	1.78	0.04
B88-06-R3-FC4	SG Blow Off										
B88-06-R3-FC5	SG Feedwater										
B88-06-R3-FC6	PreHtr to SG 1-4	9.00	2430	0.00	40.00	6.00	2.12	571.76	0.00	9.41	1.41
B88-06-R3-FC7	Reheater Drain										
B88-06-R3-FC8	Moist Sepr Drn										
B88-06-R4-FC1	Cond Ext Pump	34.00	10000	8.00	78.00	45.00	1.02	298.69	0.24	2.33	1.34
B88-06-R4-FC2	HP Heater 5A	53.00	13300	10.00	79.00	67.00	1.85	464.71	0.35	2.76	2.34
B88-06-R4-FC3	Boiler Feed Pump	13.00	5400	3.90	39.00	19.00	0.57	238.31	0.17	1.72	0.84
B88-06-R4-FC4	SG Blow Off	103.00	9770	87.00	81.00	43.00	2.53	240.34	2.14	1.99	1.06
B88-06-R4-FC5	SG Feedwater										
B88-06-R4-FC6	PreHtr to SG 1-4	12.00	2670	2.60	12.00	11.00	0.30	66.14	0.06	0.30	0.27
B88-06-F4-FC7	Reheater Drain	21.00	2140	0.00	117.00	40.00	2.10	214.00	0.00	11.70	4.00
B88-06-R4-FC8	Moist Sepr Drn										
B88-06-R5-FC1	Cond Ext Pump	31.00	8830	7.10	51.00	41.00	1.22	347.91	0.28	2.01	1.62
B88-06-R5-FC2	HP Heater 5A	18.00	6910	5.80	42.00	24.00	0.60	230.56	0.19	1.40	0.80
B88-06-R5-FC3	Boiler Feed Pump	23.00	8360	6.70	50.00	29.00	0.70	254.88	0.20	1.52	0.88
B88-06-R5-FC4	SG Blow Off						2.66	242.42	2.79	2.16	1.70
B88-06-R5-FC5	SG Feedwater										
B88-06-R5-FC6	PreHtr to SG 1-4						1.04	168.89	0.17	0.70	0.70
B88-06-R5-FC7	Reheater Drain						0.91	1012.18	0.00	4.19	1.75
B88-06-R5-FC8	Moist Sepr Drn										
B88-06-R6-FC1	Cond Ext Pump	16.00	3840	3.50	19.00	22.00	0.79	188.70	0.17	0.93	1.08
B88-06-R6-FC2	HP Heater 5A	7.00	2670	0.00	15.00	80.00	0.34	128.86	0.00	0.72	3.86
B88-06-R6-FC3	Boiler Feed Pump	10.00	3300	2.50	22.00	74.00	0.52	170.90	0.13	1.14	3.83
B88-06-R6-FC4	SG Blow Off						2.66	242.42	2.79	2.16	1.70
388-06-R6-FC5	SG Feedwater										
B88-06-R6-FC6	PreHtr to SG 1-4						1.04	168.89	0.17	0.70	0.70
B88-06-R6-FC7	Reheater Drain						0.91	1012.18	0.00	4.19	1.75
B88-06-R6-FC8	Moist Sepr Drn										

TABLE: B-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Startup June 1988. (cont'd)

Sample Number	Sample Location	Wt of Element in Particulate (ug/Fltr)					Filterable Element Concentration (ug/L)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R7-FC1	Cond Ext Pump	13.00	3090	2.90	15.00	59.00	0.56	133.07	0.12	0.65	2.54
B88-06-R7-FC2	HP Heater 5A	11.00	5330	3.00	19.00	57.00	0.39	188.47	0.11	0.67	2.02
B88-06-R7-FC3	Boiler Feed Pump	9.00	2680	2.70	18.00	14.00	0.41	122.21	0.12	0.82	0.64
B88-06-R7-FC4	SG Blow Off	228.00	20800	239.00	185.00	146.00	2.66	242.42	2.79	2.16	1.70
B88-06-R7-FC5	SG Feedwater										
B88-06-R7-FC6	PreHtr to SG 1-4	94.00	15200	15.00	63.00	63.00	1.04	168.89	0.17	0.70	0.70
B88-06-R7-FC7	Reheater Drain	12.00	13300	0.00	55.00	23.00	0.91	1012.18	0.00	4.19	1.75
B88-06-R7-FC8	Moist Sepr Drn										
B88-06-R8-FC1	Cond Ext Pump	69.00	22900	13.60	146.00	75.00	0.86	285.15	0.17	1.82	0.93
B88-06-R8-FC2	HP Heater 5A	106.00	29000	18.00	144.00	105.00	1.34	365.47	0.23	1.81	1.32
B88-06-R8-FC3	Boiler Feed Pump	119.00	33600	24.00	181.00	135.00	1.49	420.68	0.30	2.27	1.69
B88-06-R8-FC4	SG Blow Off	340.00	33700	323.00	297.00	206.00	3.12	309.46	2.97	2.73	1.89
B88-06-R8-FC5	SG Feedwater										
B88-06-R8-FC6	PreHtr to SG 1-4	84.00	17600	14.00	66.00	69.00	0.80	168.52	0.13	0.63	0.66
B88-06-R8-FC7	Reheater Drain	357.00	310000	99.00	843.00	511.00	5.25	4558.82	1.46	12.40	7.51
B88-06-R8-FC8	Moist Sepr Drn	15.00	5140	12.00	26.00	20.00	75.00	25700.00	60.00	130.00	100.00
B88-06-R9-FC1	Cond Ext Pump	22.00	8580	4.90	54.00	42.00	0.12	45.03	0.03	0.28	0.22
B88-06-R9-FC2	HP Heater 5A	59.00	15300	13.00	69.00	60.00	0.21	53.74	0.05	0.24	0.21
B88-06-R9-FC3	Boiler Feed Pump	93.00	19500	15.00	119.00	103.00	0.35	74.28	0.06	0.45	0.39
B88-06-R9-FC4	SG Blow Off	733.00	26900	297.00	272.00	747.00	2.61	95.69	1.06	0.97	2.66
B88-06-R9-FC5	SG Feedwater										
B88-06-R9-FC6	PreHtr to SG 1-4	46.00	13000	12.00	54.00	56.00	0.15	41.04	0.04	0.17	0.18
B88-06-R9-FC7	Reheater Drain	208.00	103000	85.00	310.00	202.00	0.91	450.25	0.37	1.36	0.88
B88-06-R9-FC8	Moist Sepr Drn	10.00	5550	2.60	41.00	5.70	1.00	555.00	0.26	4.10	0.57
B88-06-R10-FC1	Cond Ext Pump	11.00	3580	0.00	23.00	25.00	0.05	15.37	0.00	0.10	0.11
B88-06-R10-FC2	HP Heater 5A	10.00	3000	2.70	13.00	14.00	0.03	10.23	0.01	0.04	0.05
B88-06-R10-FC3	Boiler Feed Pump	30.00	5900	4.80	40.00	30.00	0.09	17.62	0.01	0.12	0.09
B88-06-R10-FC4	SG Blow Off	600.00	64600	477.00	555.00	179.00	2.62	281.83	2.08	2.42	0.78
B88-06-R10-FC5	SG Feedwater										
B88-06-R10-FC6	PreHtr to SG 1-4	9.00	1250	0.00	5.40	5.20	0.04	5.00	0.00	0.02	0.02
B88-06-R10-FC7	Reheater Drain	1.80	893	0.00	3.40	8.10	0.01	3.37	0.00	0.01	0.03
B88-06-R10-FC8	Moist Sepr Drn	8.10	1710	0.00	67.00	0.00	0.11	22.46	0.00	0.88	0.00
B88-06-R11-FC1	Cond Ext Pump	5.40	1960	0.00	15.00	16.00	0.02	8.97	0.00	0.07	0.07
B88-06-R11-FC2	HP Heater 5A	6.30	2530	0.00	13.00	3.00	0.02	9.48	0.00	0.05	0.01
B88-06-R11-FC3	Boiler Feed Pump	16.00	4070	3.70	21.00	62.00	0.07	18.01	0.02	0.09	0.27
B88-06-R11-FC4	SG Blow Off	1240.00	87300	640.00	745.00	473.00	3.88	273.13	2.00	2.33	1.48
B88-06-R11-FC5	SG Feedwater						0.00	0.00			
B88-06-R11-FC6	PreHtr to SG 1-4	3.70	499	0.00	3.00	0.00	0.01	1.81	0.00	0.01	0.00
B88-06-R11-FC7	Reheater Drain	3.90	1980	0.00	5.00	2.20	0.01	7.22	0.00	0.02	0.01
B88-06-R11-FC8	Moist Sepr Drn	6.20	3840	0.00	29.00	1.70	0.64	394.66	0.00	2.98	0.17
B88-06-R12-FC1	Cond Ext Pump	112.00	31000	52.00	185.00	136.00	0.76	210.68	0.35	1.26	0.92
B88-06-R12-FC2	HP Heater 5A	341.00	23500	35.00	180.00	135.00	2.25	155.01	0.23	1.19	0.89
B88-06-R12-FC3	Boiler Feed Pump	125.00	22200	35.00	146.00	153.00	0.85	150.91	0.24	0.99	1.04
B88-06-R12-FC4	SG Blow Off	99.00	5990	52.00	114.00	238.00	0.43	26.02	0.23	0.50	1.03
B88-06-R12-FC5	SG Feedwater										
B88-06-R12-FC6	PreHtr to SG 1-4	278.00	41400	53.00	154.00	221.00	1.13	168.55	0.22	0.63	0.90
B88-06-R12-FC7	Reheater Drain	542.00	18900	86.00	711.00	356.00	1.94	67.68	0.31	2.55	1.27
B88-06-R12-FC8	Moist Sepr Drn	92.00	53900	37.00	262.00	44.00	1.67	978.93	0.67	4.76	0.80

TABLE: B-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Startup June 1988. (cont'd)

Sample Number	Sample Location	Wt of Element in Particulate (ug/Fltr)					Filterable Element Concentration (ug/L)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R13-FC1	Cond Ext Pump	18.00	4150	5.00	28.00	29.00	0.47	108.90	0.13	0.73	0.76
B88-06-R13-FC2	HP Heater 5A	12.00	2020	4.00	15.00	20.00	0.09	15.27	0.03	0.11	0.15
B88-06-R13-FC3	Boiler Feed Pump	15.00	3200	4.50	21.00	20.00	0.20	41.62	0.06	0.27	0.26
B88-06-R13-FC4	SG Blow Off	444.00	46000	316.00	403.00	136.00	1.22	126.01	0.87	1.10	0.37
B88-06-R13-FC5	SG Feedwater										
B88-06-R13-FC6	PreHtr to SG 1-4	7.60	790	0.00	3.70	4.10	0.03	3.33	0.00	0.02	0.02
B88-06-R13-FC7	Reheater Drain	13.00	4250	3.40	17.00	11.00	0.07	21.41	0.02	0.09	0.06
B88-06-R13-FC8	Moist Sepr Drn	2.70	2400	0.00	14.00	2.80					
B88-06-R14-FC1	Cond Ext Pump	1.60	980	0.00	7.50	0.00	0.48	291.67	0.00	2.23	0.00
B88-06-R14-FC2	HP Heater 5A	2.80	1000	0.00	18.00	2.70	0.25	88.42	0.00	1.59	0.24
B88-06-R14-FC3	Boiler Feed Pump	3.00	1230	0.00	19.00	6.00	0.24	100.00	0.00	1.54	0.49
B88-06-R14-FC4	SG Blow Off	12.00	1220	5.00	21.00	30.00	0.10	10.26	0.04	0.18	0.25
B88-06-R14-FC5	SG Feedwater										
B88-06-R14-FC6	PreHtr to SG 1-4	2.50	356	0.00	2.90	4.00	0.02	3.50	0.00	0.03	0.04
B88-06-R14-FC7	Reheater Drain	1.30	336	0.00	1.10	2.70	0.03	6.94	0.00	0.02	0.06
B88-06-R14-FC8	Moist Sepr Drn										
B88-06-R15-FC1	Cond Ext Pump	0.00	1300	0.00	10.00	0.00	0.00	211.04	0.00	1.62	0.00
B88-06-R15-FC2	HP Heater 5A	1.40	729	0.00	27.00	1.00	0.30	155.11	0.00	5.74	0.21
B88-06-R15-FC3	Boiler Feed Pump	2.70	1200	0.00	40.00	2.30	0.18	79.00	0.00	2.63	0.15
B88-06-R15-FC4	SG Blow Off	707.00	71400	474.00	604.00	359.00	3.29	332.59	2.21	2.81	1.67
B88-06-R15-FC5	SG Feedwater										
B88-06-R15-FC6	PreHtr to SG 1-4	7.70	882	0.00	10.00	15.00	0.04	4.40	0.00	0.05	0.07
B88-06-R15-FC7	Reheater Drain	2.20	386	0.00	1.50	0.00	0.02	2.76	0.00	0.01	0.00
B88-06-R15-FC8	Moist Sepr Drn	0.00	143	0.00	1.30	0.00					
B88-06-R16-FC1	Cond Ext Pump	18.00	5300	2.70	31.00	58.00	0.16	47.59	0.02	0.28	0.52
B88-06-R16-FC2	HP Heater 5A	4.60	2030	0.00	14.00	13.00	0.05	23.95	0.00	0.17	0.15
B88-06-R16-FC3	Boiler Feed Pump	6.00	2140	0.00	16.00	13.00	0.06	22.19	0.00	0.17	0.13
B88-06-R16-FC4	SG Blow Off	49.00	3520	31.00	40.00	30.00	0.39	27.74	0.24	0.32	0.24
B88-06-R16-FC5	SG Feedwater										
B88-06-R16-FC6	PreHtr to SG 1-4	5.00	738	0.00	4.50	6.30	0.04	6.50	0.00	0.04	0.06
B88-06-R16-FC7	Reheater Drain	27.00	17900	3.90	66.00	34.00	0.43	288.15	0.06	1.06	0.55
B88-06-R16-FC8	Moist Sepr Drn	5.00	3910	0.00	23.00	1.50	35.71	27928.57	0.00	164.29	10.71
B88-06-R17-FC1	Cond Ext Pump						0.00	0.00			
B88-06-R17-FC2	HP Heater 5A	12.00	5080	3.00	24.00	23.00	0.05	23.24	0.01	0.11	0.11
B88-06-R17-FC3	Boiler Feed Pump	26.00	4050	2.60	167.00	106.00	0.06	9.17	0.01	0.38	0.24
B88-06-R17-FC4	SG Blow Off	300.00	18900	130.00	180.00	122.00	0.74	46.40	0.32	0.44	0.30
B88-06-R17-FC5	SG Feedwater										
B88-06-R17-FC6	PreHtr to SG 1-4	7.00	1980	0.00	9.10	1.90	0.03	7.60	0.00	0.03	0.01
B88-06-R17-FC7	Reheater Drain	62.00	42000	13.00	181.00	70.00	0.24	165.90	0.05	0.71	0.28
B88-06-R17-FC8	Moist Sepr Drn	2.30	2290	0.00	20.00	0.00	0.07	71.14	0.00	0.62	0.00
B88-06-R18-FC1	Cond Ext Pump	1.00	3000	0.00	13.00	17.00	0.01	18.53	0.00	0.08	0.11
B88-06-R18-FC2	HP Heater 5A	9.00	2900	0.00	10.00	11.00	0.05	17.42	0.00	0.06	0.07
B88-06-R18-FC3	Boiler Feed Pump	10.00	2200	0.00	11.00	9.00	0.06	13.35	0.00	0.07	0.05
B88-06-R18-FC4	SG Blow Off	107.00	7750	53.00	74.00	44.00	0.50	35.87	0.25	0.34	0.20
B88-06-R18-FC5	SG Feedwater										
B88-06-R18-FC6	PreHtr to SG 1-4	18.00	2300	2.80	10.00	18.00	0.07	9.56	0.01	0.04	0.07
B88-06-R18-FC7	Reheater Drain	40.00	12500	21.00	53.00	34.00	0.16	50.54	0.08	0.21	0.14
B88-06-R18-FC8	Moist Sepr Drn	10.00	15900	5.20	64.00	10.00	0.07	115.11	0.04	0.46	0.07

TABLE: B-3 Concentration of Elements in Filterable Form in Secondary System of Bruce-7 During Startup June 1988. (cont'd)

Sample Number	Sample Location	Wt of Element in Particulate (ug/Fltr)					Filterable Element Concentration (ug/L)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R19-FC1	Cond Ext Pump	6.90	3080	0.00	20.00	24.00	0.02	10.38	0.00	0.07	0.08
B88-06-R19-FC2	HP Heater 5A	23.00	6400	4.30	28.00	32.00	0.06	16.77	0.01	0.07	0.08
B88-06-R19-FC3	Boiler Feed Pump	8.90	2250	0.00	13.00	11.00	0.05	11.91	0.00	0.07	0.06
B88-06-R19-FC4	SG Blow Off	348.00	32300	293.00	316.00	163.00	2.61	242.27	2.20	2.37	1.22
B88-06-R19-FC5	SG Feedwater										
B88-06-R19-FC6	PreHtr to SG 1-4	12.00	1300	0.00	5.70	8.90	0.05	4.93	0.00	0.02	0.03
B88-06-R19-FC7	Reheater Drain	4.80	2200	0.00	6.30	4.00	0.02	8.08	0.00	0.02	0.01
B88-06-R19-FC8	Moist Sepr Drn	6.60	11000	3.90	49.00	9.00	0.04	61.82	0.02	0.28	0.05
B88-06-R20-FC1	Cond Ext Pump	2.00	698	0.00	4.00	6.00	0.02	7.04	0.00	0.04	0.06
B88-06-R20-FC2	HP Heater 5A	3.70	1050	0.00	4.80	5.00	0.03	9.20	0.00	0.04	0.04
B88-06-R20-FC3	Boiler Feed Pump	4.80	1210	0.00	6.00	7.00	0.05	12.75	0.00	0.06	0.07
B88-06-R20-FC4	SG Blow Off	140.00	10800	80.00	94.00	56.00	1.42	109.40	0.81	0.95	0.57
B88-06-R20-FC5	SG Feedwater										
B88-06-R20-FC6	PreHtr to SG 1-4	4.00	526	0.00	2.00	3.60	0.04	5.04	0.00	0.02	0.03
B88-06-R20-FC7	Reheater Drain	2.00	948	0.00	2.80	2.90	0.02	9.67	0.00	0.03	0.03
B88-06-R20-FC8	Moist Sepr Drn	14.00	7750	4.00	30.00	8.00	0.11	59.77	0.03	0.23	0.06
B88-06-R21-FC1	Cond Ext Pump	3.50	1350	0.00	8.40	11.00	0.02	5.92	0.00	0.04	0.05
B88-06-R21-FC2	HP Heater 5A	5.80	1720	0.00	9.50	9.00	0.02	5.44	0.00	0.03	0.03
B88-06-R21-FC3	Boiler Feed Pump	8.70	2400	0.00	12.00	14.00	0.04	10.13	0.00	0.05	0.06
B88-06-R21-FC4	SG Blow Off	84.00	5590	44.00	52.00	30.00	0.27	17.94	0.14	0.17	0.10
B88-06-R21-FC5	SG Feedwater										
B88-06-R21-FC6	PreHtr to SG 1-4	16.00	2190	0.00	9.00	15.00	0.06	7.93	0.00	0.03	0.05
B88-06-R21-FC7	Reheater Drain	2.50	651	0.00	1.90	1.80	0.01	2.28	0.00	0.01	0.01
B88-06-R21-FC8	Moist Sepr Drn	18.00	8570	4.60	33.00	9.50	0.04	19.11	0.01	0.07	0.02

TABLE: B-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Startup June, 1988

Sample Number	Sample Location	Filtrate Vol(ltr)	Weight of Element on IX paper (ug/filtr)					Non-filterable Element Concentration (ug/L)				
			Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
888-06-R1-FC1	Cond Ext Pump											
888-06-R1-FC2	HP Heater 5A											
888-06-R1-FC3	Boiler Feed Pump											
888-06-R1-FC4	SG Blow Off											
888-06-R1-FC5	SG Feedwater											
888-06-R1-FC6	PreHtr to SG 1-4											
888-06-R1-FC7	Reheater Drain											
888-06-R1-FC8	Moist Sepr Drn											
888-06-R2-FC1	Cond Ext Pump											
888-06-R2-FC2	HP Heater 5A											
888-06-R2-FC3	Boiler Feed Pump											
888-06-R2-FC4	SG Blow Off											
888-06-R2-FC5	SG Feedwater											
888-06-R2-FC6	PreHtr to SG 1-4											
888-06-R2-FC7	Reheater Drain											
888-06-R2-FC8	Moist Sepr Drn											
888-06-R3-FC1	Cond Ext Pump											
888-06-R3-FC2	HP Heater 5A											
888-06-R3-FC3	Boiler Feed Pump											
888-06-R3-FC4	SG Blow Off											
888-06-R3-FC5	SG Feedwater											
888-06-R3-FC6	PreHtr to SG 1-4											
888-06-R3-FC7	Reheater Drain											
888-06-R3-FC8	Moist Sepr Drn											
888-06-R4-FC1	Cond Ext Pump	3.59	0.00	1.16	0.45	0.00	0.00	0.00	0.32	0.13	0.00	0.00
888-06-R4-FC2	HP Heater 5A	1.58	0.00	0.67	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00
888-06-R4-FC3	Boiler Feed Pump	2.48	0.00	0.21	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
888-06-R4-FC4	SG Blow Off	2.13	0.08	1.18	0.00	0.45	0.08	0.04	0.55	0.00	0.21	0.04
888-06-R4-FC5	SG Feedwater											
888-06-R4-FC6	PreHtr to SG 1-4	2.41	0.00	0.26	0.00	0.09	0.00	0.00	0.11	0.00	0.04	0.00
888-06-F4-FC7	Reheater Drain	1.00	0.03	4.43	0.00	0.12	0.03	0.03	4.43	0.00	0.12	0.03
888-06-R4-FC8	Moist Sepr Drn											
888-06-R5-FC1	Cond Ext Pump	2.72	0.00	0.80	0.34	0.00	0.00	0.00	0.29	0.13	0.00	0.00
888-06-R5-FC2	HP Heater 5A	1.65	0.00	0.70	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00
888-06-R5-FC3	Boiler Feed Pump	3.59	0.00	0.30	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
888-06-R5-FC4	SG Blow Off											
888-06-R5-FC5	SG Feedwater											
888-06-R5-FC6	PreHtr to SG 1-4											
888-06-R5-FC7	Reheater Drain											
888-06-R5-FC8	Moist Sepr Drn											

TABLE: B-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Filtrate Vol(ltr)	Weight of Element on IX paper (ug/fltr)					Non-filterable Element Concentration (ug/L)				
			Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R6-FC1	Cond Ext Pump	2.18	0.00	0.71	0.27	0.00	0.00	0.00	0.33	0.12	0.00	0.00
B88-06-R6-FC2	HP Heater 5A	1.14	0.00	0.48	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00
B88-06-R6-FC3	Boiler Feed Pump	2.11	0.00	0.18	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00
B88-06-R6-FC4	SG Blow Off											
B88-06-R6-FC5	SG Feedwater											
B88-06-R6-FC6	PreHtr to SG 1-4											
B88-06-R6-FC7	Reheater Drain											
B88-06-R6-FC8	Moist Sepr Drn											
B88-06-R7-FC1	Cond Ext Pump	2.50	0.00	0.81	0.31	0.00	0.00	0.00	0.32	0.12	0.00	0.00
B88-06-R7-FC2	HP Heater 5A	1.55	0.00	0.66	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00
B88-06-R7-FC3	Boiler Feed Pump	2.40	0.00	0.20	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
B88-06-R7-FC4	SG Blow Off	4.49	0.17	2.49	0.00	0.95	0.17	0.04	0.55	0.00	0.21	0.04
B88-06-R7-FC5	SG Feedwater											
B88-06-R7-FC6	PreHtr to SG 1-4	5.38	0.00	0.58	0.00	0.20	0.00	0.00	0.11	0.00	0.04	0.00
B88-06-R7-FC7	Reheater Drain	1.31	0.04	5.81	0.00	0.16	0.04	0.03	4.44	0.00	0.12	0.03
B88-06-R7-FC8	Moist Sepr Drn											
B88-06-R8-FC1	Cond Ext Pump	8.60	0.00	2.79	1.10	0.00	0.00	0.00	0.32	0.13	0.00	0.00
B88-06-R8-FC2	HP Heater 5A	4.37	0.00	1.85	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00
B88-06-R8-FC3	Boiler Feed Pump	8.73	0.00	0.73	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
B88-06-R8-FC4	SG Blow Off	5.68	0.21	3.16	0.00	1.20	0.21	0.04	0.56	0.00	0.21	0.04
B88-06-R8-FC5	SG Feedwater											
B88-06-R8-FC6	PreHtr to SG 1-4	6.25	0.00	0.68	0.00	0.23	0.00	0.00	0.11	0.00	0.04	0.00
B88-06-R8-FC7	Reheater Drain	6.80	0.20	30.10	0.00	0.80	0.20	0.03	4.43	0.00	0.12	0.03
B88-06-R8-FC8	Moist Sepr Drn											
B88-06-R9-FC1	Cond Ext Pump	20.41	0.00	6.63	2.60	0.00	0.00	0.00	0.32	0.13	0.00	0.00
B88-06-R9-FC2	HP Heater 5A	15.70	0.00	6.65	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00
B88-06-R9-FC3	Boiler Feed Pump	28.70	0.00	2.39	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
B88-06-R9-FC4	SG Blow Off	14.69	0.54	8.16	0.00	3.10	0.54	0.04	0.56	0.00	0.21	0.04
B88-06-R9-FC5	SG Feedwater	0.00										
B88-06-R9-FC6	PreHtr to SG 1-4	18.95	0.00	1.60	0.00	0.53	0.00	0.00	0.08	0.00	0.03	0.00
B88-06-R9-FC7	Reheater Drain	22.88	0.71	101.00	0.00	2.70	0.71	0.03	4.41	0.00	0.12	0.03
B88-06-R9-FC8	Moist Sepr Drn	0.00										
B88-06-R10-FC1	Cond Ext Pump	13.41	0.00	15.47	3.09	0.00	0.00	0.00	1.15	0.23	0.00	0.00
B88-06-R10-FC2	HP Heater 5A	18.85	0.00	4.19	5.24	0.00	0.00	0.00	0.22	0.28	0.00	0.00
B88-06-R10-FC3	Boiler Feed Pump	23.88	0.00	2.99	4.18	2.39	0.00	0.00	0.13	0.18	0.10	0.00
B88-06-R10-FC4	SG Blow Off	23.39	0.00	2.09	0.00	2.50	0.00	0.00	0.09	0.00	0.11	0.00
B88-06-R10-FC5	SG Feedwater	0.00										
B88-06-R10-FC6	PreHtr to SG 1-4	10.96	0.00	2.86	0.00	0.95	0.00	0.00	0.26	0.00	0.09	0.00
B88-06-R10-FC7	Reheater Drain	26.54	0.00	2.46	3.44	0.49	0.00	0.00	0.09	0.13	0.02	0.00
B88-06-R10-FC8	Moist Sepr Drn	0.00										

TABLE: B-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Filtrate Vol(ltr)	Weight of Element on IX paper (ug/fltr)					Non-filterable Element Concentration (ug/L)				
			Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R11-FC1	Cond Ext Pump	12.58	0.00	14.52	2.90	0.00	0.00	0.00	1.15	0.23	0.00	0.00
B88-06-R11-FC2	HP Heater 5A	17.15	0.00	3.81	4.67	0.00	0.00	0.00	0.22	0.27	0.00	0.00
B88-06-R11-FC3	Boiler Feed Pump	16.12	0.00	2.02	2.82	1.61	0.00	0.00	0.13	0.17	0.10	0.00
B88-06-R11-FC4	SG Blow Off	32.16	0.00	2.91	0.00	3.49	0.00	0.00	0.09	0.00	0.11	0.00
B88-06-R11-FC5	SG Feedwater											
B88-06-R11-FC6	PreHtr to SG 1-4	12.04	0.00	3.14	0.00	1.05	0.00	0.00	0.26	0.00	0.09	0.00
B88-06-R11-FC7	Reheater Drain	27.46	0.00	2.54	3.56	0.51	0.00	0.00	0.09	0.13	0.02	0.00
B88-06-R11-FC8	Moist Sepr Drn											
B88-06-R12-FC1	Cond Ext Pump	12.71	0.00	3.18	1.99	0.79	0.00	0.00	0.25	0.16	0.06	0.00
B88-06-R12-FC2	HP Heater 5A	10.15	0.00	3.74	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00
B88-06-R12-FC3	Boiler Feed Pump	11.17	0.00	3.29	0.00	1.18	0.00	0.00	0.29	0.00	0.11	0.00
B88-06-R12-FC4	SG Blow Off	11.60	0.00	5.80	0.97	5.41	0.00	0.00	0.50	0.08	0.47	0.00
B88-06-R12-FC5	SG Feedwater											
B88-06-R12-FC6	PreHtr to SG 1-4	22.94	0.51	6.12	0.00	7.14	0.00	0.02	0.27	0.00	0.31	0.00
B88-06-R12-FC7	Reheater Drain	18.70	0.00	3.27	0.00	0.58	0.00	0.00	0.17	0.00	0.03	0.00
B88-06-R12-FC8	Moist Sepr Drn											
B88-06-R13-FC1	Cond Ext Pump	3.29	0.00	0.82	0.50	0.21	0.00	0.00	0.25	0.15	0.06	0.00
B88-06-R13-FC2	HP Heater 5A	8.85	0.00	3.26	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00
B88-06-R13-FC3	Boiler Feed Pump	5.83	0.00	1.71	0.00	0.62	0.00	0.00	0.29	0.00	0.11	0.00
B88-06-R13-FC4	SG Blow Off	18.40	0.00	9.20	1.53	8.59	0.00	0.00	0.50	0.08	0.47	0.00
B88-06-R13-FC5	SG Feedwater											
B88-06-R13-FC6	PreHtr to SG 1-4	22.06	0.49	5.88	0.00	6.86	0.00	0.02	0.27	0.00	0.31	0.00
B88-06-R13-FC7	Reheater Drain	13.30	0.00	2.33	0.00	0.42	0.00	0.00	0.18	0.00	0.03	0.00
B88-06-R13-FC8	Moist Sepr Drn											
B88-06-R14-FC1	Cond Ext Pump	1.00	0.00	2.45	0.00	2.24	0.00	0.00	2.45	0.00	2.24	0.00
B88-06-R14-FC2	HP Heater 5A											
B88-06-R14-FC3	Boiler Feed Pump	1.79	0.00	3.13	0.00	0.58	0.00	0.00	1.75	0.00	0.32	0.00
B88-06-R14-FC4	SG Blow Off	3.57	0.00	3.50	0.00	10.35	0.00	0.00	0.98	0.00	2.90	0.00
B88-06-R14-FC5	SG Feedwater											
B88-06-R14-FC6	PreHtr to SG 1-4	6.06	0.00	1.58	0.00	1.08	4.03	0.00	0.26	0.00	0.18	0.67
B88-06-R14-FC7	Reheater Drain	1.29	0.00	1.65	0.00	0.00	0.00	0.00	1.28	0.00	0.00	0.00
B88-06-R14-FC8	Moist Sepr Drn											
B88-06-R15-FC1	Cond Ext Pump	0.65	0.00	4.90	0.00	4.50	0.00	0.00	7.54	0.00	6.92	0.00
B88-06-R15-FC2	HP Heater 5A											
B88-06-R15-FC3	Boiler Feed Pump	2.21	0.00	3.86	0.00	0.72	0.00	0.00	1.75	0.00	0.33	0.00
B88-06-R15-FC4	SG Blow Off	6.43	0.00	6.30	0.00	18.65	0.00	0.00	0.98	0.00	2.90	0.00
B88-06-R15-FC5	SG Feedwater											
B88-06-R15-FC6	PreHtr to SG 1-4	11.94	0.00	3.12	0.00	2.12	5.97	0.00	0.26	0.00	0.18	0.50
B88-06-R15-FC7	Reheater Drain	3.71	0.00	4.75	0.00	0.00	0.00	0.00	1.28	0.00	0.00	0.00
B88-06-R15-FC8	Moist Sepr Drn											

TABLE: B-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Filtrate Vol(ltr)	Weight of Element on IX paper (ug/fltr)					Non-filterable Element Concentration (ug/L)				
			Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R16-FC1	Cond Ext Pump	7.48	0.00	3.90	0.00	0.32	0.36	0.00	0.52	0.00	0.04	0.05
B88-06-R16-FC2	HP Heater 5A	5.87	0.31	2.35	0.00	0.75	0.31	0.05	0.40	0.00	0.13	0.05
B88-06-R16-FC3	Boiler Feed Pump	5.56	0.00	1.24	0.71	1.40	0.00	0.00	0.22	0.13	0.25	0.00
B88-06-R16-FC4	SG Blow Off	8.55	0.24	1.87	0.00	14.00	0.00	0.03	0.22	0.00	1.64	0.00
B88-06-R16-FC5	SG Feedwater	0.00										
B88-06-R16-FC6	PreHtr to SG 1-4	5.77	0.00	1.21	1.21	0.30	0.30	0.00	0.21	0.21	0.05	0.05
B88-06-R16-FC7	Reheater Drain	5.52	0.00	1.18	0.00	0.59	0.20	0.00	0.21	0.00	0.11	0.04
B88-06-R16-FC8	Moist Sepr Drn	0.00										
B88-06-R17-FC1	Cond Ext Pump	15.52	0.00	8.10	0.00	0.67	0.74	0.00	0.52	0.00	0.04	0.05
B88-06-R17-FC2	HP Heater 5A	15.13	0.79	6.05	0.00	1.95	0.79	0.05	0.40	0.00	0.13	0.05
B88-06-R17-FC3	Boiler Feed Pump	25.44	0.00	5.74	3.28	6.48	0.00	0.00	0.23	0.13	0.25	0.00
B88-06-R17-FC4	SG Blow Off	27.45	0.76	6.02	0.00	44.99	0.00	0.03	0.22	0.00	1.64	0.00
B88-06-R17-FC5	SG Feedwater	0.00										
B88-06-R17-FC6	PreHtr to SG 1-4	13.23	0.00	2.78	2.78	0.70	0.70	0.00	0.21	0.21	0.05	0.05
B88-06-R17-FC7	Reheater Drain	22.48	0.00	4.82	0.00	2.41	0.80	0.00	0.21	0.00	0.11	0.04
B88-06-R17-FC8	Moist Sepr Drn											
B88-06-R18-FC1	Cond Ext Pump	9.89	0.00	1.41	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
B88-06-R18-FC2	HP Heater 5A	13.97	0.36	1.82	0.00	1.02	0.00	0.03	0.13	0.00	0.07	0.00
B88-06-R18-FC3	Boiler Feed Pump	13.51	0.00	2.80	0.00	2.28	0.46	0.00	0.21	0.00	0.17	0.03
B88-06-R18-FC4	SG Blow Off	8.66	0.00	8.86	2.35	25.98	0.00	0.00	1.02	0.27	3.00	0.00
B88-06-R18-FC5	SG Feedwater											
B88-06-R18-FC6	PreHtr to SG 1-4	11.22	0.00	1.91	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00
B88-06-R18-FC7	Reheater Drain	21.42	0.00	1.90	1.90	1.38	0.00	0.00	0.09	0.09	0.06	0.00
B88-06-R18-FC8	Moist Sepr Drn	7.92	0.00	4.84	0.00	20.68	0.44	0.00	0.61	0.00	2.61	0.06
B88-06-R19-FC1	Cond Ext Pump	18.11	0.00	2.59	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
B88-06-R19-FC2	HP Heater 5A	32.03	0.84	4.18	0.00	2.36	0.00	0.03	0.13	0.00	0.07	0.00
B88-06-R19-FC3	Boiler Feed Pump	15.49	0.00	3.20	0.00	2.62	0.53	0.00	0.21	0.00	0.17	0.03
B88-06-R19-FC4	SG Blow Off	5.34	0.00	5.34	1.45	16.02	0.00	0.00	1.00	0.27	3.00	0.00
B88-06-R19-FC5	SG Feedwater											
B88-06-R19-FC6	PreHtr to SG 1-4	12.28	0.00	2.09	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00
B88-06-R19-FC7	Reheater Drain	23.58	0.00	2.10	2.10	1.52	0.00	0.00	0.09	0.09	0.06	0.00
B88-06-R19-FC8	Moist Sepr Drn	10.08	0.00	6.16	0.00	26.32	0.56	0.00	0.61	0.00	2.61	0.06
B88-06-R20-FC1	Cond Ext Pump											
B88-06-R20-FC2	HP Heater 5A											
B88-06-R20-FC3	Boiler Feed Pump											
B88-06-R20-FC4	SG Blow Off											
B88-06-R20-FC5	SG Feedwater											
B88-06-R20-FC6	PreHtr to SG 1-4											
B88-06-R20-FC7	Reheater Drain											
B88-06-R20-FC8	Moist Sepr Drn											

TABLE: B-4 Concentration of Elements in Non-Filterable Form in Secondary System of Bruce-7 During Startup June, 1988 (cont'd)

Sample Number	Sample Location	Filtrate Vol(ltr)	Weight of Element on IX paper (ug/fltr)					Non-filterable Element Concentration (ug/L)				
			Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R21-FC1	Cond Ext Pump											
B88-06-R21-FC2	HP Heater 5A											
B88-06-R21-FC3	Boiler Feed Pump											
B88-06-R21-FC4	SG Blow Off											
B88-06-R21-FC5	SG Feedwater											
B88-06-R21-FC6	PreHtr to SG 1-4											
B88-06-R21-FC7	Reheater Drain											
B88-06-R21-FC8	Moist Sepr Drn											

TABLE: B-5 Total Element Concentration at Sampling Locations of Bruce-7 During Startup June 1988.

Sample Number	Sample Location	Element Total Concentration (ug/L)					Corrosion Product in Filterable Form (%)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R1-FC1	Cond Ext Pump										
B88-06-R1-FC2	HP Heater 5A										
B88-06-R1-FC3	Boiler Feed Pump										
B88-06-R1-FC4	SG Blow Off										
B88-06-R1-FC5	SG Feedwater										
B88-06-R1-FC6	PreHtr to SG 1-4										
B88-06-R1-FC7	Reheater Drain										
B88-06-R1-FC8	Moist Sepr Drn										
B88-06-R2-FC1	Cond Ext Pump										
B88-06-R2-FC2	HP Heater 5A										
B88-06-R2-FC3	Boiler Feed Pump										
B88-06-R2-FC4	SG Blow Off										
B88-06-R2-FC5	SG Feedwater										
B88-06-R2-FC6	PreHtr to SG 1-4										
B88-06-R2-FC7	Reheater Drain										
B88-06-R2-FC8	Moist Sepr Drn										
B88-06-R3-FC1	Cond Ext Pump										
B88-06-R3-FC2	HP Heater 5A										
B88-06-R3-FC3	Boiler Feed Pump										
B88-06-R3-FC4	SG Blow Off										
B88-06-R3-FC5	SG Feedwater										
B88-06-R3-FC6	PreHtr to SG 1-4										
B88-06-R3-FC7	Reheater Drain										
B88-06-R3-FC8	Moist Sepr Drn										
B88-06-R4-FC1	Cond Ext Pump	1.02	299.01	0.36	2.33	1.34	100.00	99.89	65.59	100.00	100.00
B88-06-R4-FC2	HP Heater 5A	1.85	465.13	0.35	2.76	2.34	100.00	99.91	100.00	100.00	100.00
B88-06-R4-FC3	Boiler Feed Pump	0.57	238.39	0.17	1.72	0.84	100.00	99.96	100.00	100.00	100.00
B88-06-R4-FC4	SG Blow Off	2.57	240.90	2.14	2.20	1.10	98.54	99.77	100.00	90.41	96.57
B88-06-R4-FC5	SG Feedwater										
B88-06-R4-FC6	PreHtr to SG 1-4	0.30	66.25	0.06	0.33	0.27	100.00	99.84	100.00	88.84	100.00
B88-06-F4-FC7	Reheater Drain	2.13	218.43	0.00	11.82	4.03	98.59	97.97		98.98	99.26
B88-06-R4-FC8	Moist Sepr Drn										
B88-06-R5-FC1	Cond Ext Pump	1.22	348.21	0.40	2.01	1.62	100.00	99.92	69.12	100.00	100.00
B88-06-R5-FC2	HP Heater 5A	0.60	230.99	0.19	1.40	0.80	100.00	99.82	100.00	100.00	100.00
B88-06-R5-FC3	Boiler Feed Pump	0.70	254.96	0.20	1.52	0.88	100.00	99.97	100.00	100.00	100.00
B88-06-R5-FC4	SG Blow Off	2.66	242.42	2.79	2.16	1.70	100.00	100.00	100.00	100.00	100.00
B88-06-R5-FC5	SG Feedwater										
B88-06-R5-FC6	PreHtr to SG 1-4	1.04	168.89	0.17	0.70	0.70	100.00	100.00	100.00	100.00	100.00
B88-06-R5-FC7	Reheater Drain	0.91	1012.18	0.00	4.19	1.75	100.00	100.00		100.00	100.00
B88-06-R5-FC8	Moist Sepr Drn										

TABLE: B-5 Total Element Concentration at Sampling Locations of Bruce-7 During Startup June 1988. (cont'd)

Sample Number	Sample Location	Element Total Concentration (ug/L)					Corrosion Product in Filterable Form (%)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R6-FC1	Cond Ext Pump	0.79	189.02	0.30	0.93	1.08	100.00	99.83	58.14	100.00	100.00
B88-06-R6-FC2	HP Heater 5A	0.34	129.28	0.00	0.72	3.86	100.00	99.67		100.00	100.00
B88-06-R6-FC3	Boiler Feed Pump	0.52	170.98	0.13	1.14	3.83	100.00	99.95	100.00	100.00	100.00
B88-06-R6-FC4	SG Blow Off	2.66	242.42	2.79	2.16	1.70	100.00	100.00	100.00	100.00	100.00
B88-06-R6-FC5	SG Feedwater										
B88-06-R6-FC6	PreHtr to SG 1-4	1.04	168.89	0.17	0.70	0.70	100.00	100.00	100.00	100.00	100.00
B88-06-R6-FC7	Reheater Drain	0.91	1012.18	0.00	4.19	1.75	100.00	100.00		100.00	100.00
B88-06-R6-FC8	Moist Sepr Drn										
B88-06-R7-FC1	Cond Ext Pump	0.56	133.40	0.25	0.65	2.54	100.00	99.76	50.18	100.00	100.00
B88-06-R7-FC2	HP Heater 5A	0.39	188.90	0.11	0.67	2.02	100.00	99.77	100.00	100.00	100.00
B88-06-R7-FC3	Boiler Feed Pump	0.41	122.29	0.12	0.82	0.64	100.00	99.93	100.00	100.00	100.00
B88-06-R7-FC4	SG Blow Off	2.70	242.98	2.79	2.37	1.74	98.60	99.77	100.00	91.06	97.82
B88-06-R7-FC5	SG Feedwater										
B88-06-R7-FC6	PreHtr to SG 1-4	1.04	169.00	0.17	0.74	0.70	100.00	99.94	100.00	94.96	100.00
B88-06-R7-FC7	Reheater Drain	0.94	1016.61	0.00	4.31	1.78	96.76	99.56		97.16	98.29
B88-06-R7-FC8	Moist Sepr Drn										
B88-06-R8-FC1	Cond Ext Pump	0.86	285.47	0.30	1.82	0.93	100.00	99.89	56.97	100.00	100.00
B88-06-R8-FC2	HP Heater 5A	1.34	365.89	0.23	1.81	1.32	100.00	99.88	100.00	100.00	100.00
B88-06-R8-FC3	Boiler Feed Pump	1.49	420.77	0.30	2.27	1.69	100.00	99.98	100.00	100.00	100.00
B88-06-R8-FC4	SG Blow Off	3.16	310.01	2.97	2.94	1.93	98.83	99.82	100.00	92.81	98.08
B88-06-R8-FC5	SG Feedwater										
B88-06-R8-FC6	PreHtr to SG 1-4	0.80	168.63	0.13	0.67	0.66	100.00	99.94	100.00	94.50	100.00
B88-06-R8-FC7	Reheater Drain	5.28	4563.25	1.46	12.51	7.54	99.44	99.90	100.00	99.06	99.61
B88-06-R8-FC8	Moist Sepr Drn										
B88-06-R9-FC1	Cond Ext Pump	0.12	45.36	0.15	0.28	0.22	100.00	99.28	16.80	100.00	100.00
B88-06-R9-FC2	HP Heater 5A	0.21	54.16	0.05	0.24	0.21	100.00	99.22	100.00	100.00	100.00
B88-06-R9-FC3	Boiler Feed Pump	0.35	74.36	0.06	0.45	0.39	100.00	99.89	100.00	100.00	100.00
B88-06-R9-FC4	SG Blow Off	2.64	96.25	1.06	1.18	2.69	98.61	99.42	100.00	82.10	98.64
B88-06-R9-FC5	SG Feedwater										
B88-06-R9-FC6	PreHtr to SG 1-4	0.15	41.12	0.04	0.20	0.18	100.00	99.79	100.00	85.91	100.00
B88-06-R9-FC7	Reheater Drain	0.94	454.67	0.37	1.47	0.91	96.70	99.03	100.00	91.99	96.61
B88-06-R9-FC8	Moist Sepr Drn										
B88-06-R10-FC1	Cond Ext Pump	0.05	16.53	0.23	0.10	0.11	100.00	93.02	0.00	100.00	100.00
B88-06-R10-FC2	HP Heater 5A	0.03	10.45	0.29	0.04	0.05	100.00	97.87	3.21	100.00	100.00
B88-06-R10-FC3	Boiler Feed Pump	0.09	17.75	0.19	0.22	0.09	100.00	99.29	7.57	54.42	100.00
B88-06-R10-FC4	SG Blow Off	2.62	281.91	2.08	2.53	0.78	100.00	99.97	100.00	95.77	100.00
B88-06-R10-FC5	SG Feedwater										
B88-06-R10-FC6	PreHtr to SG 1-4	0.04	5.26	0.00	0.11	0.02	100.00	95.04		19.93	100.00
B88-06-R10-FC7	Reheater Drain	0.01	3.46	0.13	0.03	0.03	100.00	97.32	0.00	41.01	100.00
B88-06-R10-FC8	Moist Sepr Drn										
B88-06-R11-FC1	Cond Ext Pump	0.02	10.13	0.23	0.07	0.07	100.00	88.60	0.00	100.00	100.00
B88-06-R11-FC2	HP Heater 5A	0.02	9.71	0.27	0.05	0.01	100.00	97.71	0.00	100.00	100.00
B88-06-R11-FC3	Boiler Feed Pump	0.07	18.13	0.19	0.19	0.27	100.00	99.31	8.56	48.20	100.00
B88-06-R11-FC4	SG Blow Off	3.88	273.22	2.00	2.44	1.48	100.00	99.97	100.00	95.55	100.00
B88-06-R11-FC5	SG Feedwater										
B88-06-R11-FC6	PreHtr to SG 1-4	0.01	2.07	0.00	0.10	0.00	100.00	87.43		11.12	
B88-06-R11-FC7	Reheater Drain	0.01	7.32	0.13	0.04	0.01	100.00	98.74	0.00	49.55	100.00
B88-06-R11-FC8	Moist Sepr Drn	0.64	394.66	0.00	2.98	0.17	100.00	100.00		100.00	100.00

TABLE: B-5 Total Element Concentration at Sampling Locations of Bruce-7 During Startup June 1988. (cont'd)

Sample Number	Sample Location	Element Total Concentration (ug/L)					Corrosion Product in Filterable Form (%)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R12-FC1	Cond Ext Pump	0.76	210.93	0.51	1.32	0.92	100.00	99.88	69.30	95.29	100.00
B88-06-R12-FC2	HP Heater 5A	2.25	155.38	0.23	1.19	0.89	100.00	99.76	100.00	100.00	100.00
B88-06-R12-FC3	Boiler Feed Pump	0.85	151.20	0.24	1.10	1.04	100.00	99.81	100.00	90.38	100.00
B88-06-R12-FC4	SG Blow Off	0.43	26.52	0.31	0.96	1.03	100.00	98.11	72.98	51.50	100.00
B88-06-R12-FC5	SG Feedwater										
B88-06-R12-FC6	PreHtr to SG 1-4	1.15	168.81	0.22	0.94	0.90	98.07	99.84	100.00	66.83	100.00
B88-06-R12-FC7	Reheater Drain	1.94	67.86	0.31	2.58	1.27	100.00	99.74	100.00	98.80	100.00
B88-06-R12-FC8	Moist Sepr Drn										
B88-06-R13-FC1	Cond Ext Pump	0.47	109.14	0.28	0.80	0.76	100.00	99.77	46.33	92.01	100.00
B88-06-R13-FC2	HP Heater 5A	0.09	15.64	0.03	0.11	0.15	100.00	97.64	100.00	100.00	100.00
B88-06-R13-FC3	Boiler Feed Pump	0.20	41.92	0.06	0.38	0.26	100.00	99.30	100.00	71.98	100.00
B88-06-R13-FC4	SG Blow Off	1.22	126.51	0.95	1.57	0.37	100.00	99.60	91.24	70.28	100.00
B88-06-R13-FC5	SG Feedwater										
B88-06-R13-FC6	PreHtr to SG 1-4	0.05	3.60	0.00	0.33	0.02	59.06	92.59		4.78	100.00
B88-06-R13-FC7	Reheater Drain	0.07	21.58	0.02	0.12	0.06	100.00	99.19	100.00	73.06	100.00
B88-06-R13-FC8	Moist Sepr Drn										
B88-06-R14-FC1	Cond Ext Pump	0.48	294.12	0.00	4.47	0.00	100.00	99.17		49.91	
B88-06-R14-FC2	HP Heater 5A	0.25	88.42	0.00	1.59	0.24					
B88-06-R14-FC3	Boiler Feed Pump	0.24	101.75	0.00	1.87	0.49	100.00	98.28		82.66	100.00
B88-06-R14-FC4	SG Blow Off	0.10	11.24	0.04	3.08	0.25	100.00	91.28	100.00	5.74	100.00
B88-06-R14-FC5	SG Feedwater										
B88-06-R14-FC6	PreHtr to SG 1-4	0.02	3.76	0.00	0.21	0.70	100.00	93.07		13.80	5.59
B88-06-R14-FC7	Reheater Drain	0.03	8.22	0.00	0.02	0.06	100.00	84.44		100.00	100.00
B88-06-R14-FC8	Moist Sepr Drn										
B88-06-R15-FC1	Cond Ext Pump	0.00	218.58	0.00	8.55	0.00	ERR	96.55		18.99	
B88-06-R15-FC2	HP Heater 5A	0.30	155.11	0.00	5.74	0.21					
B88-06-R15-FC3	Boiler Feed Pump	0.18	80.75	0.00	2.96	0.15	100.00	97.84		88.99	100.00
B88-06-R15-FC4	SG Blow Off	3.29	333.57	2.21	5.71	1.67	100.00	99.71	100.00	49.24	100.00
B88-06-R15-FC5	SG Feedwater										
B88-06-R15-FC6	PreHtr to SG 1-4	0.04	4.66	0.00	0.23	0.57	100.00	94.40		21.94	13.02
B88-06-R15-FC7	Reheater Drain	0.02	4.04	0.00	0.01	0.00	100.00	68.32		100.00	
B88-06-R15-FC8	Moist Sepr Drn										
B88-06-R16-FC1	Cond Ext Pump	0.16	48.11	0.02	0.32	0.57	100.00	98.92	100.00	86.68	91.54
B88-06-R16-FC2	HP Heater 5A	0.11	24.35	0.00	0.29	0.21	50.68	98.36		56.39	74.39
B88-06-R16-FC3	Boiler Feed Pump	0.06	22.41	0.13	0.42	0.13	100.00	99.00	0.00	39.71	100.00
B88-06-R16-FC4	SG Blow Off	0.41	27.96	0.24	1.95	0.24	93.22	99.22	100.00	16.14	100.00
B88-06-R16-FC5	SG Feedwater										
B88-06-R16-FC6	PreHtr to SG 1-4	0.04	6.71	0.21	0.09	0.11	100.00	96.87	0.00	43.26	51.63
B88-06-R16-FC7	Reheater Drain	0.43	288.37	0.06	1.17	0.58	100.00	99.93	100.00	90.86	93.79
B88-06-R16-FC8	Moist Sepr Drn										

TABLE: B-5 Total Element Concentration at Sampling Locations of Bruce-7 During Startup June 1988. (cont'd)

Sample Number	Sample Location	Element Total Concentration (ug/L)					Corrosion Product in Filterable Form (%)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R17-FC1	Cond Ext Pump	0.00	0.52	0.00	0.04	0.05	ERR	0.00		0.00	0.00
B88-06-R17-FC2	HP Heater 5A	0.11	23.64	0.01	0.24	0.16	51.25	98.31	100.00	46.00	66.84
B88-06-R17-FC3	Boiler Feed Pump	0.06	9.39	0.13	0.63	0.24	100.00	97.60	4.37	59.75	100.00
B88-06-R17-FC4	SG Blow Off	0.76	46.62	0.32	2.08	0.30	96.38	99.53	100.00	21.24	100.00
B88-06-R17-FC5	SG Feedwater										
B88-06-R17-FC6	PreHtr to SG 1-4	0.03	7.81	0.21	0.09	0.06	100.00	97.31	0.00	39.75	12.11
B88-06-R17-FC7	Reheater Drain	0.24	166.11	0.05	0.82	0.31	100.00	99.87	100.00	86.96	88.60
B88-06-R17-FC8	Moist Sepr Drn	0.07	71.14	0.00	0.62	0.00	100.00	100.00		100.00	
B88-06-R18-FC1	Cond Ext Pump	0.01	18.67	0.00	0.08	0.11	100.00	99.24		100.00	100.00
B88-06-R18-FC2	HP Heater 5A	0.08	17.55	0.00	0.13	0.07	67.72	99.26		45.14	100.00
B88-06-R18-FC3	Boiler Feed Pump	0.06	13.56	0.00	0.24	0.09	100.00	98.47		28.34	61.60
B88-06-R18-FC4	SG Blow Off	0.50	36.89	0.52	3.34	0.20	100.00	97.23	47.48	10.25	100.00
B88-06-R18-FC5	SG Feedwater										
B88-06-R18-FC6	PreHtr to SG 1-4	0.07	9.73	0.01	0.04	0.07	100.00	98.25	100.00	100.00	100.00
B88-06-R18-FC7	Reheater Drain	0.16	50.63	0.17	0.28	0.14	100.00	99.82	48.91	76.89	100.00
B88-06-R18-FC8	Moist Sepr Drn	0.07	115.72	0.04	3.07	0.13	100.00	99.47	100.00	15.07	56.58
B88-06-R19-FC1	Cond Ext Pump	0.02	10.53	0.00	0.07	0.08	100.00	98.64		100.00	100.00
B88-06-R19-FC2	HP Heater 5A	0.09	16.90	0.01	0.15	0.08	69.68	99.23	100.00	49.90	100.00
B88-06-R19-FC3	Boiler Feed Pump	0.05	12.11	0.00	0.24	0.09	100.00	98.29		28.91	62.98
B88-06-R19-FC4	SG Blow Off	2.61	243.27	2.47	5.37	1.22	100.00	99.59	89.00	44.14	100.00
B88-06-R19-FC5	SG Feedwater										
B88-06-R19-FC6	PreHtr to SG 1-4	0.05	5.10	0.00	0.02	0.03	100.00	96.67		100.00	100.00
B88-06-R19-FC7	Reheater Drain	0.02	8.17	0.09	0.09	0.01	100.00	98.91	0.00	26.42	100.00
B88-06-R19-FC8	Moist Sepr Drn	0.04	62.43	0.02	2.89	0.11	100.00	99.02	100.00	9.54	47.66
B88-06-R20-FC1	Cond Ext Pump	0.02	7.04	0.00	0.04	0.06					
B88-06-R20-FC2	HP Heater 5A	0.03	9.20	0.00	0.04	0.04					
B88-06-R20-FC3	Boiler Feed Pump	0.05	12.75	0.00	0.06	0.07					
B88-06-R20-FC4	SG Blow Off	1.42	109.40	0.81	0.95	0.57					
B88-06-R20-FC5	SG Feedwater										
B88-06-R20-FC6	PreHtr to SG 1-4	0.04	5.04	0.00	0.02	0.03					
B88-06-R20-FC7	Reheater Drain	0.02	9.67	0.00	0.03	0.03					
B88-06-R20-FC8	Moist Sepr Drn	0.11	59.77	0.03	0.23	0.06					
B88-06-R21-FC1	Cond Ext Pump	0.02	5.92	0.00	0.04	0.05					
B88-06-R21-FC2	HP Heater 5A	0.02	5.44	0.00	0.03	0.03					
B88-06-R21-FC3	Boiler Feed Pump	0.04	10.13	0.00	0.05	0.06					
B88-06-R21-FC4	SG Blow Off	0.27	17.94	0.14	0.17	0.10					
B88-06-R21-FC5	SG Feedwater										
B88-06-R21-FC6	PreHtr to SG 1-4	0.06	7.93	0.00	0.03	0.05					
B88-06-R21-FC7	Reheater Drain	0.01	2.28	0.00	0.01	0.01					
B88-06-R21-FC8	Moist Sepr Drn	0.04	19.11	0.01	0.07	0.02					

TABLE: B-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During June 1988 Startup

Sample Number	Sample Location	Filterable Element Molar Ratio (Fe =1)					Non-filterable Element Molar Ratio (Fe = 1)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R1-FC3	Boiler Feed Pump	0.0025	1.0000	0.0005	0.0110	0.0025					
B88-06-R2-FC3	Boiler Feed Pump	0.0015	1.0000	0.0000	0.0163	0.0007					
B88-06-R3-FC3	Boiler Feed Pump	0.0010	1.0000	0.0000	0.0172	0.0004					
B88-06-R4-FC3	Boiler Feed Pump	0.0023	1.0000	0.0008	0.0073	0.0038	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R5-FC3	Boiler Feed Pump	0.0026	1.0000	0.0009	0.0061	0.0037	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R6-FC3	Boiler Feed Pump	0.0029	1.0000	0.0009	0.0068	0.0241	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R7-FC3	Boiler Feed Pump	0.0032	1.0000	0.0012	0.0068	0.0056	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R8-FC3	Boiler Feed Pump	0.0034	1.0000	0.0008	0.0055	0.0043	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R9-FC3	Boiler Feed Pump	0.0045	1.0000	0.0009	0.0062	0.0057	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R10-FC3	Boiler Feed Pump	0.0048	1.0000	0.0009	0.0069	0.0055	0.0000	1.0000	1.6300	0.8126	0.0000
B88-06-R11-FC3	Boiler Feed Pump	0.0037	1.0000	0.0011	0.0052	0.0164	0.0000	1.0000	1.6277	0.8102	0.0000
B88-06-R12-FC3	Boiler Feed Pump	0.0054	1.0000	0.0018	0.0067	0.0074	0.0000	1.0000	0.0000	0.3646	0.0000
B88-06-R13-FC3	Boiler Feed Pump	0.0045	1.0000	0.0016	0.0067	0.0067	0.0000	1.0000	0.0000	0.3686	0.0000
B88-06-R14-FC3	Boiler Feed Pump	0.0023	1.0000	0.0000	0.0157	0.0052	0.0000	1.0000	0.0000	0.1884	0.0000
B88-06-R15-FC3	Boiler Feed Pump	0.0021	1.0000	0.0000	0.0339	0.0021	0.0000	1.0000	0.0000	0.1896	0.0000
B88-06-R16-FC3	Boiler Feed Pump	0.0027	1.0000	0.0000	0.0076	0.0065	0.0000	1.0000	0.6676	1.1477	0.0000
B88-06-R17-FC3	Boiler Feed Pump	0.0061	1.0000	0.0007	0.0419	0.0281	0.0000	1.0000	0.6663	1.1476	0.0000
B88-06-R18-FC3	Boiler Feed Pump	0.0043	1.0000	0.0000	0.0051	0.0044	0.0000	1.0000	0.0000	0.8278	0.1764
B88-06-R19-FC3	Boiler Feed Pump	0.0038	1.0000	0.0000	0.0059	0.0053	0.0000	1.0000	0.0000	0.8323	0.1779
B88-06-R20-FC3	Boiler Feed Pump	0.0038	1.0000	0.0000	0.0050	0.0062					
B88-06-R21-FC3	Boiler Feed Pump	0.0034	1.0000	0.0000	0.0051	0.0063					
B88-06-R1-FC1	Cond Ext Pump	0.0037	1.0000	0.0007	0.0150	0.0032					
B88-06-R2-FC1	Cond Ext Pump	0.0014	1.0000	0.0000	0.0164	0.0007					
B88-06-R3-FC1	Cond Ext Pump	0.0008	1.0000	0.0000	0.0158	0.0006					
B88-06-R4-FC1	Cond Ext Pump	0.0032	1.0000	0.0009	0.0079	0.0048	0.0000	1.0000	0.4523	0.0000	0.0000
B88-06-R5-FC1	Cond Ext Pump	0.0033	1.0000	0.0009	0.0059	0.0050	0.0000	1.0000	0.4955	0.0000	0.0000
B88-06-R6-FC1	Cond Ext Pump	0.0040	1.0000	0.0011	0.0050	0.0062	0.0000	1.0000	0.4434	0.0000	0.0000
B88-06-R7-FC1	Cond Ext Pump	0.0040	1.0000	0.0011	0.0049	0.0205	0.0000	1.0000	0.4462	0.0000	0.0000
B88-06-R8-FC1	Cond Ext Pump	0.0029	1.0000	0.0007	0.0065	0.0035	0.0000	1.0000	0.4597	0.0000	0.0000
B88-06-R9-FC1	Cond Ext Pump	0.0024	1.0000	0.0007	0.0064	0.0053	0.0000	1.0000	0.4572	0.0000	0.0000
B88-06-R10-FC1	Cond Ext Pump	0.0029	1.0000	0.0000	0.0065	0.0075	0.0000	1.0000	0.2329	0.0000	0.0000
B88-06-R11-FC1	Cond Ext Pump	0.0026	1.0000	0.0000	0.0078	0.0088	0.0000	1.0000	0.2329	0.0000	0.0000
B88-06-R12-FC1	Cond Ext Pump	0.0034	1.0000	0.0020	0.0061	0.0047	0.0000	1.0000	0.7296	0.2525	0.0000
B88-06-R13-FC1	Cond Ext Pump	0.0041	1.0000	0.0014	0.0069	0.0075	0.0000	1.0000	0.7110	0.2603	0.0000
B88-06-R14-FC1	Cond Ext Pump	0.0016	1.0000	0.0000	0.0078	0.0000	0.0000	1.0000	0.0000	0.9294	0.0000
B88-06-R15-FC1	Cond Ext Pump	0.0000	1.0000	0.0000	0.0078	0.0000	0.0000	1.0000	0.0000	0.9336	0.0000
B88-06-R16-FC1	Cond Ext Pump	0.0032	1.0000	0.0006	0.0059	0.0118	0.0000	1.0000	0.0000	0.0834	0.0991
B88-06-R17-FC1	Cond Ext Pump						0.0000	1.0000	0.0000	0.0841	0.0981
B88-06-R18-FC1	Cond Ext Pump	0.0003	1.0000	0.0000	0.0044	0.0061	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R19-FC1	Cond Ext Pump	0.0021	1.0000	0.0000	0.0066	0.0084	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R20-FC1	Cond Ext Pump	0.0027	1.0000	0.0000	0.0058	0.0092					
B88-06-R21-FC1	Cond Ext Pump	0.0025	1.0000	0.0000	0.0063	0.0088					

TABLE: B-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During June 1989 Startup (cont'd)

Sample Number	Sample Location	Filterable Element Molar Ratio (Fe =1)					Non-filterable Element Molar Ratio (Fe = 1)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R1-FC2	HP Heater 5A										
B88-06-R2-FC2	HP Heater 5A										
B88-06-R3-FC2	HP Heater 5A										
B88-06-R4-FC2	HP Heater 5A	0.0038	1.0000	0.0009	0.0060	0.0054	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R5-FC2	HP Heater 5A	0.0025	1.0000	0.0010	0.0062	0.0037	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R6-FC2	HP Heater 5A	0.0025	1.0000	0.0000	0.0057	0.0322	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R7-FC2	HP Heater 5A	0.0020	1.0000	0.0007	0.0036	0.0115	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R8-FC2	HP Heater 5A	0.0035	1.0000	0.0007	0.0050	0.0039	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R9-FC2	HP Heater 5A	0.0037	1.0000	0.0010	0.0046	0.0042	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R10-FC2	HP Heater 5A	0.0032	1.0000	0.0010	0.0044	0.0050	0.0000	1.0000	1.4582	0.0000	0.0000
B88-06-R11-FC2	HP Heater 5A	0.0024	1.0000	0.0000	0.0052	0.0013	0.0000	1.0000	1.4292	0.0000	0.0000
B88-06-R12-FC2	HP Heater 5A	0.0138	1.0000	0.0017	0.0078	0.0062	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R13-FC2	HP Heater 5A	0.0057	1.0000	0.0023	0.0075	0.0106	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R14-FC2	HP Heater 5A	0.0027	1.0000	0.0000	0.0183	0.0029					
B88-06-R15-FC2	HP Heater 5A	0.0018	1.0000	0.0000	0.0377	0.0015					
B88-06-R16-FC2	HP Heater 5A	0.0022	1.0000	0.0000	0.0070	0.0069	0.1255	1.0000	0.0000	0.3244	0.1417
B88-06-R17-FC2	HP Heater 5A	0.0022	1.0000	0.0007	0.0048	0.0049	0.1242	1.0000	0.0000	0.3277	0.1402
B88-06-R18-FC2	HP Heater 5A	0.0030	1.0000	0.0000	0.0035	0.0041	0.1882	1.0000	0.0000	0.5697	0.0000
B88-06-R19-FC2	HP Heater 5A	0.0034	1.0000	0.0008	0.0044	0.0054	0.1912	1.0000	0.0000	0.5739	0.0000
B88-06-R20-FC2	HP Heater 5A	0.0034	1.0000	0.0000	0.0046	0.0051					
B88-06-R21-FC2	HP Heater 5A	0.0032	1.0000	0.0000	0.0056	0.0056					
B88-06-R1-FC8	Moist Sepr Drn										
B88-06-R2-FC8	Moist Sepr Drn										
B88-06-R3-FC8	Moist Sepr Drn										
B88-06-R4-FC8	Moist Sepr Drn										
B88-06-R5-FC8	Moist Sepr Drn										
B88-06-R6-FC8	Moist Sepr Drn										
B88-06-R7-FC8	Moist Sepr Drn										
B88-06-R8-FC8	Moist Sepr Drn	0.0028	1.0000	0.0027	0.0051	0.0042					
B88-06-R9-FC8	Moist Sepr Drn	0.0017	1.0000	0.0005	0.0075	0.0011					
B88-06-R10-FC8	Moist Sepr Drn	0.0045	1.0000	0.0000	0.0398	0.0000					
B88-06-R11-FC8	Moist Sepr Drn	0.0015	1.0000	0.0000	0.0077	0.0005					
B88-06-R12-FC8	Moist Sepr Drn	0.0016	1.0000	0.0008	0.0049	0.0009					
B88-06-R13-FC8	Moist Sepr Drn										
B88-06-R14-FC8	Moist Sepr Drn										
B88-06-R15-FC8	Moist Sepr Drn										
B88-06-R16-FC8	Moist Sepr Drn	0.0012	1.0000	0.0000	0.0060	0.0004					
B88-06-R17-FC8	Moist Sepr Drn	0.0010	1.0000	0.0000	0.0089	0.0000					
B88-06-R18-FC8	Moist Sepr Drn	0.0006	1.0000	0.0004	0.0041	0.0007	0.0000	1.0000	0.0000	4.3435	0.0976
B88-06-R19-FC8	Moist Sepr Drn	0.0006	1.0000	0.0004	0.0045	0.0009					
B88-06-R20-FC8	Moist Sepr Drn	0.0017	1.0000	0.0006	0.0039	0.0011					
B88-06-R21-FC8	Moist Sepr Drn	0.0020	1.0000	0.0006	0.0039	0.0012					

TABLE: B-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During June 1988 Startup (cont'd)

Sample Number	Sample Location	Filterable Element Molar Ratio (Fe =1)					Non-filterable Element Molar Ratio (Fe = 1)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R1-FC6	PreHtr to SG 1-4	0.0147	1.0000	0.0013	0.0059	0.0035					
B88-06-R2-FC6	PreHtr to SG 1-4	0.0065	1.0000	0.0000	0.0093	0.0019					
B88-06-R3-FC6	PreHtr to SG 1-4	0.0035	1.0000	0.0000	0.0167	0.0027					
B88-06-R4-FC6	PreHtr to SG 1-4	0.0043	1.0000	0.0011	0.0046	0.0044	0.0000	1.0000	0.0000	0.3519	0.0000
B88-06-R5-FC6	PreHtr to SG 1-4	0.0059	1.0000	0.0012	0.0042	0.0045					
B88-06-R6-FC6	PreHtr to SG 1-4	0.0059	1.0000	0.0012	0.0042	0.0045					
B88-06-R7-FC6	PreHtr to SG 1-4	0.0059	1.0000	0.0012	0.0042	0.0045	0.0000	1.0000	0.0000	0.3505	0.0000
B88-06-R8-FC6	PreHtr to SG 1-4	0.0045	1.0000	0.0009	0.0038	0.0042	0.0000	1.0000	0.0000	0.3438	0.0000
B88-06-R9-FC6	PreHtr to SG 1-4	0.0034	1.0000	0.0011	0.0042	0.0046	0.0000	1.0000	0.0000	0.3367	0.0000
B88-06-R10-FC6	PreHtr to SG 1-4	0.0069	1.0000	0.0000	0.0044	0.0045	0.0000	1.0000	0.0000	0.3377	0.0000
B88-06-R11-FC6	PreHtr to SG 1-4	0.0071	1.0000	0.0000	0.0061	0.0000	0.0000	1.0000	0.0000	0.3399	0.0000
B88-06-R12-FC6	PreHtr to SG 1-4	0.0064	1.0000	0.0015	0.0038	0.0057	0.0793	1.0000	0.0000	1.1860	0.0000
B88-06-R13-FC6	PreHtr to SG 1-4	0.0092	1.0000	0.0000	0.0048	0.0056	0.0793	1.0000	0.0000	1.1860	0.0000
B88-06-R14-FC6	PreHtr to SG 1-4	0.0067	1.0000	0.0000	0.0083	0.0121	0.0000	1.0000	0.0000	0.6949	2.7395
B88-06-R15-FC6	PreHtr to SG 1-4	0.0083	1.0000	0.0000	0.0115	0.0183	0.0000	1.0000	0.0000	0.6907	2.0551
B88-06-R16-FC6	PreHtr to SG 1-4	0.0064	1.0000	0.0000	0.0062	0.0092	0.0000	1.0000	1.1660	0.2520	0.2663
B88-06-R17-FC6	PreHtr to SG 1-4	0.0034	1.0000	0.0000	0.0047	0.0010	0.0000	1.0000	1.1660	0.2560	0.2704
B88-06-R18-FC6	PreHtr to SG 1-4	0.0074	1.0000	0.0014	0.0044	0.0084	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R19-FC6	PreHtr to SG 1-4	0.0088	1.0000	0.0000	0.0045	0.0074	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R20-FC6	PreHtr to SG 1-4	0.0072	1.0000	0.0000	0.0039	0.0074					
B88-06-R21-FC6	PreHtr to SG 1-4	0.0070	1.0000	0.0000	0.0042	0.0074					
B88-06-R1-FC7	Reheater Drain										
B88-06-R2-FC7	Reheater Drain										
B88-06-R3-FC7	Reheater Drain										
B88-06-F4-FC7	Reheater Drain	0.0093	1.0000	0.0000	0.0556	0.0201	0.0064	1.0000	0.0000	0.0275	0.0073
B88-06-R5-FC7	Reheater Drain	0.0009	1.0000	0.0000	0.0042	0.0019					
B88-06-R6-FC7	Reheater Drain	0.0009	1.0000	0.0000	0.0042	0.0019					
B88-06-R7-FC7	Reheater Drain	0.0009	1.0000	0.0000	0.0042	0.0019	0.0066	1.0000	0.0000	0.0280	0.0074
B88-06-R8-FC7	Reheater Drain	0.0011	1.0000	0.0004	0.0028	0.0018	0.0063	1.0000	0.0000	0.0270	0.0071
B88-06-R9-FC7	Reheater Drain	0.0019	1.0000	0.0010	0.0031	0.0021	0.0067	1.0000	0.0000	0.0272	0.0076
B88-06-R10-FC7	Reheater Drain	0.0019	1.0000	0.0000	0.0039	0.0097	0.0000	1.0000	1.6305	0.2025	0.0000
B88-06-R11-FC7	Reheater Drain	0.0019	1.0000	0.0000	0.0026	0.0012	0.0000	1.0000	1.6342	0.2041	0.0000
B88-06-R12-FC7	Reheater Drain	0.0273	1.0000	0.0053	0.0382	0.0202	0.0000	1.0000	0.0000	0.1803	0.0000
B88-06-R13-FC7	Reheater Drain	0.0029	1.0000	0.0009	0.0041	0.0028	0.0000	1.0000	0.0000	0.1832	0.0000
B88-06-R14-FC7	Reheater Drain	0.0037	1.0000	0.0000	0.0033	0.0086	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R15-FC7	Reheater Drain	0.0054	1.0000	0.0000	0.0040	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
B88-06-R16-FC7	Reheater Drain	0.0014	1.0000	0.0003	0.0037	0.0020	0.0000	1.0000	0.0000	0.5083	0.1820
B88-06-R17-FC7	Reheater Drain	0.0014	1.0000	0.0004	0.0044	0.0018	0.0000	1.0000	0.0000	0.5083	0.1783
B88-06-R18-FC7	Reheater Drain	0.0030	1.0000	0.0020	0.0043	0.0029	0.0000	1.0000	1.1660	0.7383	0.0000
B88-06-R19-FC7	Reheater Drain	0.0021	1.0000	0.0000	0.0029	0.0020	0.0000	1.0000	1.1660	0.7358	0.0000
B88-06-R20-FC7	Reheater Drain	0.0020	1.0000	0.0000	0.0030	0.0033					
B88-06-R21-FC7	Reheater Drain	0.0037	1.0000	0.0000	0.0030	0.0030					

TABLE: B-6 Molar Ratio of Elements in Filterable and Non-filterable Corrosion Products Collected During June 1988 Startup (cont'd)

Sample Number	Sample Location	Filterable Element Molar Ratio (Fe =1)					Non-filterable Element Molar Ratio (Fe = 1)				
		Ni	Fe	Ti	Mn	Cr	Ni	Fe	Ti	Mn	Cr
B88-06-R1-FC4	SG Blow Off										
B88-06-R2-FC4	SG Blow Off										
B88-06-R3-FC4	SG Blow Off										
B88-06-R4-FC4	SG Blow Off	0.0100	1.0000	0.0104	0.0084	0.0047	0.0645	1.0000	0.0000	0.3877	0.0728
B88-06-R5-FC4	SG Blow Off	0.0104	1.0000	0.0134	0.0090	0.0075					
B88-06-R6-FC4	SG Blow Off	0.0104	1.0000	0.0134	0.0090	0.0075					
B88-06-R7-FC4	SG Blow Off	0.0104	1.0000	0.0134	0.0090	0.0075	0.0650	1.0000	0.0000	0.3878	0.0733
B88-06-R8-FC4	SG Blow Off	0.0096	1.0000	0.0112	0.0090	0.0066	0.0632	1.0000	0.0000	0.3860	0.0714
B88-06-R9-FC4	SG Blow Off	0.0259	1.0000	0.0129	0.0103	0.0298	0.0630	1.0000	0.0000	0.3862	0.0711
B88-06-R10-FC4	SG Blow Off	0.0088	1.0000	0.0086	0.0087	0.0030	0.0000	1.0000	0.0000	1.2160	0.0000
B88-06-R11-FC4	SG Blow Off	0.0135	1.0000	0.0085	0.0087	0.0058	0.0000	1.0000	0.0000	1.2192	0.0000
B88-06-R12-FC4	SG Blow Off	0.0157	1.0000	0.0101	0.0193	0.0427	0.0000	1.0000	0.1950	0.9482	0.0000
B88-06-R13-FC4	SG Blow Off	0.0092	1.0000	0.0080	0.0089	0.0032	0.0000	1.0000	0.1939	0.9492	0.0000
B88-06-R14-FC4	SG Blow Off	0.0094	1.0000	0.0048	0.0175	0.0264	0.0000	1.0000	0.0000	3.0061	0.0000
B88-06-R15-FC4	SG Blow Off	0.0094	1.0000	0.0077	0.0086	0.0054	0.0000	1.0000	0.0000	3.0094	0.0000
B88-06-R16-FC4	SG Blow Off	0.0132	1.0000	0.0103	0.0116	0.0092	0.1221	1.0000	0.0000	7.6106	0.0000
B88-06-R17-FC4	SG Blow Off	0.0151	1.0000	0.0080	0.0097	0.0069	0.1201	1.0000	0.0000	7.5972	0.0000
B88-06-R18-FC4	SG Blow Off	0.0131	1.0000	0.0080	0.0097	0.0061	0.0000	1.0000	0.3093	2.9808	0.0000
B88-06-R19-FC4	SG Blow Off	0.0103	1.0000	0.0106	0.0099	0.0054	0.0000	1.0000	0.3166	3.0497	0.0000
B88-06-R20-FC4	SG Blow Off	0.0123	1.0000	0.0086	0.0088	0.0056					
B88-06-R21-FC4	SG Blow Off	0.0143	1.0000	0.0092	0.0095	0.0058					

TABLE: B-7 Corrosion Product Concentration Profile at 8 Sampling Locations of Bruce-7 During June, 1988 Startup

Sample Number	Sample Location	Ni(T) ug/L	Fe(T) ug/L	Ti(T) ug/L	Mn(T) ug/L	Cr(T) ug/L	Particle conc.(ug/L)
B88-06-R4-FC3	Boiler Feed Pump	0.57	238.4	0.17	1.72	0.84	459.0
B88-06-R5-FC3	Boiler Feed Pump	0.70	255.0	0.20	1.52	0.88	457.3
B88-06-R6-FC3	Boiler Feed Pump	0.52	171.0	0.13	1.14	3.83	274.5
B88-06-R7-FC3	Boiler Feed Pump	0.41	122.3	0.12	0.82	0.64	200.6
B88-06-R8-FC3	Boiler Feed Pump	1.49	420.8	0.30	2.27	1.69	692.4
B88-06-R9-FC3	Boiler Feed Pump	0.35	74.4	0.06	0.45	0.39	136.0
B88-06-R10-FC3	Boiler Feed Pump	0.09	17.7	0.19	0.22	0.09	29.0
B88-06-R11-FC3	Boiler Feed Pump	0.07	18.1	0.19	0.19	0.27	23.9
B88-06-R12-FC3	Boiler Feed Pump	0.85	151.2	0.24	1.10	1.04	267.8
B88-06-R13-FC3	Boiler Feed Pump	0.20	41.9	0.06	0.38	0.26	93.7
B88-06-R14-FC3	Boiler Feed Pump	0.24	101.7	0.00	1.87	0.49	211.4
B88-06-R15-FC3	Boiler Feed Pump	0.18	80.7	0.00	2.96	0.15	210.7
B88-06-R16-FC3	Boiler Feed Pump	0.06	22.4	0.13	0.42	0.13	53.9
B88-06-R17-FC3	Boiler Feed Pump	0.06	9.4	0.13	0.63	0.24	15.8
B88-06-R18-FC3	Boiler Feed Pump	0.06	13.6	0.00	0.24	0.09	23.1
B88-06-R19-FC3	Boiler Feed Pump	0.05	12.1	0.00	0.24	0.09	21.7
B88-06-R20-FC3	Boiler Feed Pump	0.05	12.8	0.00	0.06	0.07	20.0
B88-06-R21-FC3	Boiler Feed Pump	0.04	10.1	0.00	0.05	0.06	15.2
B88-06-R4-FC1	Cond Ext Pump	1.02	299.0	0.36	2.33	1.34	582.4
B88-06-R5-FC1	Cond Ext Pump	1.22	348.2	0.40	2.01	1.62	575.3
B88-06-R6-FC1	Cond Ext Pump	0.79	189.0	0.30	0.93	1.08	304.7
B88-06-R7-FC1	Cond Ext Pump	0.56	133.4	0.25	0.65	2.54	193.8
B88-06-R8-FC1	Cond Ext Pump	0.86	285.5	0.30	1.82	0.93	479.4
B88-06-R9-FC1	Cond Ext Pump	0.12	45.4	0.15	0.28	0.22	75.1
B88-06-R10-FC1	Cond Ext Pump	0.05	16.5	0.23	0.10	0.11	30.1
B88-06-R11-FC1	Cond Ext Pump	0.02	10.1	0.23	0.07	0.07	18.3
B88-06-R12-FC1	Cond Ext Pump	0.76	210.9	0.51	1.32	0.92	384.7
B88-06-R13-FC1	Cond Ext Pump	0.47	109.1	0.28	0.80	0.76	241.4
B88-06-R14-FC1	Cond Ext Pump	0.48	294.1	0.00	4.47	0.00	744.0
B88-06-R15-FC1	Cond Ext Pump	0.00	218.6	0.00	8.55	0.00	503.2
B88-06-R16-FC1	Cond Ext Pump	0.16	48.1	0.02	0.32	0.57	93.4
B88-06-R17-FC1	Cond Ext Pump	0.00	0.5	0.00	0.04	0.05	51.5
B88-06-R18-FC1	Cond Ext Pump	0.01	18.7	0.00	0.08	0.11	33.4
B88-06-R19-FC1	Cond Ext Pump	0.02	10.5	0.00	0.07	0.08	18.5
B88-06-R20-FC1	Cond Ext Pump	0.02	7.0	0.00	0.04	0.06	12.1
B88-06-R21-FC1	Cond Ext Pump	0.02	5.9	0.00	0.04	0.05	8.8
B88-06-R4-FC2	HP Heater 5A	1.85	465.1	0.35	2.76	2.34	974.8
B88-06-R5-FC2	HP Heater 5A	0.60	231.0	0.19	1.40	0.80	423.8
B88-06-R6-FC2	HP Heater 5A	0.34	129.3	0.00	0.72	3.86	241.3
B88-06-R7-FC2	HP Heater 5A	0.39	188.9	0.11	0.67	2.02	166.2
B88-06-R8-FC2	HP Heater 5A	1.34	365.9	0.23	1.81	1.32	602.4
B88-06-R9-FC2	HP Heater 5A	0.21	54.2	0.05	0.24	0.21	81.8
B88-06-R10-FC2	HP Heater 5A	0.03	10.5	0.29	0.04	0.05	15.7
B88-06-R11-FC2	HP Heater 5A	0.02	9.7	0.27	0.05	0.01	13.9

TABLE: B-7 Corrosion Product Concentration Profile at 8 Sampling Locations of Bruce-7 During June, 1988 Startup (cont'd)

Sample Number	Sample Location	Ni(T) ug/L	Fe(T) ug/L	Ti(T) ug/L	Mn(T) ug/L	Cr(T) ug/L	Particle conc.(ug/L)
B88-06-R12-FC2	HP Heater 5A	2.25	155.4	0.23	1.19	0.89	267.8
B88-06-R13-FC2	HP Heater 5A	0.09	15.6	0.03	0.11	0.15	42.3
B88-06-R14-FC2	HP Heater 5A	0.25	88.4	0.00	1.59	0.24	265.3
B88-06-R15-FC2	HP Heater 5A	0.30	155.1	0.00	5.74	0.21	489.4
B88-06-R16-FC2	HP Heater 5A	0.11	24.4	0.00	0.29	0.21	51.9
B88-06-R17-FC2	HP Heater 5A	0.11	23.6	0.01	0.24	0.16	38.9
B88-06-R18-FC2	HP Heater 5A	0.08	17.6	0.00	0.13	0.07	26.4
B88-06-R19-FC2	HP Heater 5A	0.09	16.9	0.01	0.15	0.08	28.3
B88-06-R20-FC2	HP Heater 5A	0.03	9.2	0.00	0.04	0.04	18.4
B88-06-R21-FC2	HP Heater 5A	0.02	5.4	0.00	0.03	0.03	9.5
B88-06-R4-FC8	Moist Sepr Drn						
B88-06-R5-FC8	Moist Sepr Drn						
B88-06-R6-FC8	Moist Sepr Drn						
B88-06-R7-FC8	Moist Sepr Drn						
B88-06-R8-FC8	Moist Sepr Drn						57500.0
B88-06-R9-FC8	Moist Sepr Drn						1360.0
B88-06-R10-FC8	Moist Sepr Drn						46.0
B88-06-R11-FC8	Moist Sepr Drn	0.64	394.7	0.00	2.98	0.17	390.5
B88-06-R12-FC8	Moist Sepr Drn						5063.6
B88-06-R13-FC8	Moist Sepr Drn						
B88-06-R14-FC8	Moist Sepr Drn						
B88-06-R15-FC8	Moist Sepr Drn						
B88-06-R16-FC8	Moist Sepr Drn						52857.1
B88-06-R17-FC8	Moist Sepr Drn	0.07	71.1	0.00	0.62	0.00	114.9
B88-06-R18-FC8	Moist Sepr Drn	0.07	115.7	0.04	3.07	0.13	202.0
B88-06-R19-FC8	Moist Sepr Drn	0.04	62.4	0.02	2.89	0.11	98.9
B88-06-R20-FC8	Moist Sepr Drn	0.11	59.8	0.03	0.23	0.06	97.9
B88-06-R21-FC8	Moist Sepr Drn	0.04	19.1	0.01	0.07	0.02	41.0
B88-06-R4-FC6	PreHtr to SG 1-4	0.30	66.2	0.06	0.33	0.27	116.4
B88-06-R5-FC6	PreHtr to SG 1-4	1.04	168.9	0.17	0.70	0.70	258.9
B88-06-R6-FC6	PreHtr to SG 1-4	1.04	168.9	0.17	0.70	0.70	258.9
B88-06-R7-FC6	PreHtr to SG 1-4	1.04	169.0	0.17	0.74	0.70	258.9
B88-06-R8-FC6	PreHtr to SG 1-4	0.80	168.6	0.13	0.67	0.66	260.4
B88-06-R9-FC6	PreHtr to SG 1-4	0.15	41.1	0.04	0.20	0.18	71.3
B88-06-R10-FC6	PreHtr to SG 1-4	0.04	5.3	0.00	0.11	0.02	7.2
B88-06-R11-FC6	PreHtr to SG 1-4	0.01	2.1	0.00	0.10	0.00	4.4
B88-06-R12-FC6	PreHtr to SG 1-4	1.15	168.8	0.22	0.94	0.90	278.5
B88-06-R13-FC6	PreHtr to SG 1-4	0.05	3.6	0.00	0.33	0.02	8.0
B88-06-R14-FC6	PreHtr to SG 1-4	0.02	3.8	0.00	0.21	0.70	33.5
B88-06-R15-FC6	PreHtr to SG 1-4	0.04	4.7	0.00	0.23	0.57	14.5
B88-06-R16-FC6	PreHtr to SG 1-4	0.04	6.7	0.21	0.09	0.11	15.9
B88-06-R17-FC6	PreHtr to SG 1-4	0.03	7.8	0.21	0.09	0.06	10.0
B88-06-R18-FC6	PreHtr to SG 1-4	0.07	9.7	0.01	0.04	0.07	18.3
B88-06-R19-FC6	PreHtr to SG 1-4	0.05	5.1	0.00	0.02	0.03	14.4

TABLE: B-7 Corrosion Product Concentration Profile at 8 Sampling Lications of Bruce-7 During June, 1988 Startup (cont'd)

Sample Number	Sample Location	Ni(T) ug/L	Fe(T) ug/L	Ti(T) ug/L	Mn(T) ug/L	Cr(T) ug/L	Particle conc.(ug/L)
B88-06-R20-FC6	PreHtr to SG 1-4	0.04	5.0	0.00	0.02	0.03	5.7
B88-06-R21-FC6	PreHtr to SG 1-4	0.06	7.9	0.00	0.03	0.05	13.8
B88-06-F4-FC7	Reheater Drain	2.13	218.4	0.00	11.82	4.03	3240.0
B88-06-R5-FC7	Reheater Drain	0.91	1012.2	0.00	4.19	1.75	1636.2
B88-06-R6-FC7	Reheater Drain	0.91	1012.2	0.00	4.19	1.75	1636.2
B88-06-R7-FC7	Reheater Drain	0.94	1016.6	0.00	4.31	1.78	1636.2
B88-06-R8-FC7	Reheater Drain	5.28	4563.3	1.46	12.51	7.54	7725.0
B88-06-R9-FC7	Reheater Drain	0.94	454.7	0.37	1.47	0.91	695.9
B88-06-R10-FC7	Reheater Drain	0.01	3.5	0.13	0.03	0.03	8.7
B88-06-R11-FC7	Reheater Drain	0.01	7.3	0.13	0.04	0.01	10.2
B88-06-R12-FC7	Reheater Drain	1.94	67.9	0.31	2.58	1.27	1035.3
B88-06-R13-FC7	Reheater Drain	0.07	21.6	0.02	0.12	0.06	40.8
B88-06-R14-FC7	Reheater Drain	0.03	8.2	0.00	0.02	0.06	10.3
B88-06-R15-FC7	Reheater Drain	0.02	4.0	0.00	0.01	0.00	4.3
B88-06-R16-FC7	Reheater Drain	0.43	288.4	0.06	1.17	0.58	468.4
B88-06-R17-FC7	Reheater Drain	0.24	166.1	0.05	0.82	0.31	361.8
B88-06-R18-FC7	Reheater Drain	0.16	50.6	0.17	0.28	0.14	136.7
B88-06-R19-FC7	Reheater Drain	0.02	8.2	0.09	0.09	0.01	19.5
B88-06-R20-FC7	Reheater Drain	0.02	9.7	0.00	0.03	0.03	14.3
B88-06-R21-FC7	Reheater Drain	0.01	2.3	0.00	0.01	0.01	3.8
B88-06-R4-FC4	SG Blow Off	2.57	240.9	2.14	2.20	1.10	393.6
B88-06-R5-FC4	SG Blow Off	2.66	242.4	2.79	2.16	1.70	384.6
B88-06-R6-FC4	SG Blow Off	2.66	242.4	2.79	2.16	1.70	384.6
B88-06-R7-FC4	SG Blow Off	2.70	243.0	2.79	2.37	1.74	384.6
B88-06-R8-FC4	SG Blow Off	3.16	310.0	2.97	2.94	1.93	481.2
B88-06-R9-FC4	SG Blow Off	2.64	96.2	1.06	1.18	2.69	751.7
B88-06-R10-FC4	SG Blow Off	2.62	281.9	2.08	2.53	0.78	498.6
B88-06-R11-FC4	SG Blow Off	3.88	273.2	2.00	2.44	1.48	445.8
B88-06-R12-FC4	SG Blow Off	0.43	26.5	0.31	0.96	1.03	3542.1
B88-06-R13-FC4	SG Blow Off	1.22	126.5	0.95	1.57	0.37	204.6
B88-06-R14-FC4	SG Blow Off	0.10	11.2	0.04	3.08	0.25	14.3
B88-06-R15-FC4	SG Blow Off	3.29	333.6	2.21	5.71	1.67	516.6
B88-06-R16-FC4	SG Blow Off	0.41	28.0	0.24	1.95	0.24	56.0
B88-06-R17-FC4	SG Blow Off	0.76	46.6	0.32	2.08	0.30	66.3
B88-06-R18-FC4	SG Blow Off	0.50	36.9	0.52	3.34	0.20	58.8
B88-06-R19-FC4	SG Blow Off	2.61	243.3	2.47	5.37	1.22	25397.5
B88-06-R20-FC4	SG Blow Off	1.42	109.4	0.81	0.95	0.57	181.3
B88-06-R21-FC4	SG Blow Off	0.27	17.9	0.14	0.17	0.10	29.2

TABLE: B-7 Corrosion Product Concentration Profile at 8 Sampling Locations of Bruce-7 During June, 1988 Startup (cont'd)

Sample Number	Sample Location	Ni(T) ug/L	Fe(T) ug/L	Ti(T) ug/L	Mn(T) ug/L	Cr(T) ug/L	Particle conc.(ug/L)
B88-06-R4-FC4	SG Blow Off	2.57	240.9	2.14	2.20	1.10	393.6
B88-06-R5-FC4	SG Blow Off	2.66	242.4	2.79	2.16	1.70	384.6
B88-06-R6-FC4	SG Blow Off	2.66	242.4	2.79	2.16	1.70	384.6
B88-06-R7-FC4	SG Blow Off	2.70	243.0	2.79	2.37	1.74	384.6
B88-06-R8-FC4	SG Blow Off	3.16	310.0	2.97	2.94	1.93	481.2
B88-06-R9-FC4	SG Blow Off	2.64	96.2	1.06	1.18	2.69	751.7
B88-06-R10-FC4	SG Blow Off	2.62	281.9	2.08	2.53	0.78	498.6
B88-06-R11-FC4	SG Blow Off	3.88	273.2	2.00	2.44	1.48	445.8
B88-06-R12-FC4	SG Blow Off	0.43	26.5	0.31	0.96	1.03	3542.1
B88-06-R13-FC4	SG Blow Off	1.22	126.5	0.95	1.57	0.37	204.6
B88-06-R14-FC4	SG Blow Off	0.10	11.2	0.04	3.08	0.25	14.3
B88-06-R15-FC4	SG Blow Off	3.29	333.6	2.21	5.71	1.67	516.6
B88-06-R16-FC4	SG Blow Off	0.41	28.0	0.24	1.95	0.24	56.0
B88-06-R17-FC4	SG Blow Off	0.76	46.6	0.32	2.08	0.30	66.3
B88-06-R18-FC4	SG Blow Off	0.50	36.9	0.52	3.34	0.20	58.8
B88-06-R19-FC4	SG Blow Off	2.61	243.3	2.47	5.37	1.22	25397.5
B88-06-R20-FC4	SG Blow Off	1.42	109.4	0.81	0.95	0.57	181.3
B88-06-R21-FC4	SG Blow Off	0.27	17.9	0.14	0.17	0.10	29.2
B88-06-R4-FC5	SG Feedwater	0.30	66.2	0.06	0.33	0.27	1000.0
B88-06-R5-FC5	SG Feedwater	1.04	168.9	0.17	0.70	0.70	
B88-06-R6-FC5	SG Feedwater	1.04	168.9	0.17	0.70	0.70	
B88-06-R7-FC5	SG Feedwater	1.04	169.0	0.17	0.74	0.70	
B88-06-R8-FC5	SG Feedwater	0.80	168.6	0.13	0.67	0.66	
B88-06-R9-FC5	SG Feedwater	0.15	41.1	0.04	0.20	0.18	
B88-06-R10-FC5	SG Feedwater	0.04	5.3	0.00	0.11	0.02	
B88-06-R11-FC5	SG Feedwater	0.01	2.1	0.00	0.10	0.00	0.0
B88-06-R12-FC5	SG Feedwater	1.15	168.8	0.22	0.94	0.90	
B88-06-R13-FC5	SG Feedwater	0.05	3.6	0.00	0.33	0.02	
B88-06-R14-FC5	SG Feedwater	0.02	3.8	0.00	0.21	0.70	
B88-06-R15-FC5	SG Feedwater	0.04	4.7	0.00	0.23	0.57	
B88-06-R16-FC5	SG Feedwater	0.04	6.7	0.21	0.09	0.11	
B88-06-R17-FC5	SG Feedwater	0.03	7.8	0.21	0.09	0.06	
B88-06-R18-FC5	SG Feedwater	0.07	9.7	0.01	0.04	0.07	
B88-06-R19-FC5	SG Feedwater	0.05	5.1	0.00	0.02	0.03	
B88-06-R20-FC5	SG Feedwater	0.04	5.0	0.00	0.02	0.03	
B88-06-R21-FC5	SG Feedwater	0.06	7.9	0.00	0.03	0.05	

TABLE: B-8 Cumulative Transport of Corrosion Products at Bruce-7 During June 1988 Startup

Sample Number	Sample Location	Avg Flow Rate (kg/s)	Ref. Time (hour)	Cumulative Transport (g) Ni	Fe	Ti	Mn	Cr	Particle
B88-06-R4-FC3	Boiler Feed Pump	249.9	33.74	1.16	481	0.35	3.47	1.69	925
B88-06-R5-FC3	Boiler Feed Pump	292.9	35.64	2.56	992	0.76	6.53	3.46	1842
B88-06-R6-FC3	Boiler Feed Pump	314.5	36.65	3.15	1186	0.90	7.82	7.82	2154
B88-06-R7-FC3	Boiler Feed Pump	313.0	38.00	3.78	1373	1.09	9.07	8.79	2460
B88-06-R8-FC3	Boiler Feed Pump	645.7	43.17	21.68	6429	4.70	36.31	29.10	10780
B88-06-R9-FC3	Boiler Feed Pump	1116.8	55.22	38.84	10031	7.47	58.26	48.11	17367
B88-06-R10-FC3	Boiler Feed Pump	1114.6	68.50	43.62	10977	17.56	69.96	52.88	18911
B88-06-R11-FC3	Boiler Feed Pump	1113.5	82.33	47.54	11982	28.17	80.65	68.10	20236
B88-06-R12-FC3	Boiler Feed Pump	704.3	92.89	70.28	16028	34.54	110.03	95.92	27402
B88-06-R13-FC3	Boiler Feed Pump	10.6	103.93						
B88-06-R14-FC3	Boiler Feed Pump	2.2	111.00	0.01	6	0.00	0.11	0.03	12
B88-06-R15-FC3	Boiler Feed Pump	105.6	127.50	1.13	512	0.00	18.66	0.98	1333
B88-06-R16-FC3	Boiler Feed Pump	456.4	138.50	2.25	917	2.31	26.21	3.41	2307
B88-06-R17-FC3	Boiler Feed Pump	639.5	151.56	4.02	1199	6.36	45.23	10.63	2783
B88-06-R18-FC3	Boiler Feed Pump	752.9	161.06	5.58	1549	6.36	51.30	12.91	3377
B88-06-R19-FC3	Boiler Feed Pump	968.3	175.43	7.94	2155	6.36	63.21	17.54	4464
B88-06-R20-FC3	Boiler Feed Pump	1040.2	182.12	9.21	2475	6.36	64.80	19.39	4965
B88-06-R21-FC3	Boiler Feed Pump	1087.4	204.00	12.36	3343	6.36	69.14	24.45	6268
B88-06-R4-FC1	Cond Ext Pump	236.1	33.74	1.93	570	0.69	4.44	2.56	1110
B88-06-R5-FC1	Cond Ext Pump	280.5	35.64	4.28	1238	1.47	8.30	5.66	2214
B88-06-R6-FC1	Cond Ext Pump	305.8	36.65	5.15	1447	1.80	9.33	6.86	2551
B88-06-R7-FC1	Cond Ext Pump	303.0	38.00	5.98	1644	2.17	10.28	10.61	2837
B88-06-R8-FC1	Cond Ext Pump	603.1	43.17	15.62	4849	5.50	30.69	21.09	8218
B88-06-R9-FC1	Cond Ext Pump	913.4	55.22	20.19	6646	11.57	41.92	29.83	11192
B88-06-R10-FC1	Cond Ext Pump	900.5	68.50	22.23	7357	21.49	46.17	34.45	12486
B88-06-R11-FC1	Cond Ext Pump	896.2	82.33	23.33	7809	31.78	49.24	37.72	13303
B88-06-R12-FC1	Cond Ext Pump	596.2	92.89	40.57	12586	43.33	79.12	58.65	22015
B88-06-R13-FC1	Cond Ext Pump	15.2	103.93						
B88-06-R14-FC1	Cond Ext Pump	1.5	111.00	0.02	11	0.00	0.17	0.00	29
B88-06-R15-FC1	Cond Ext Pump	100.7	127.50	0.02	1319	0.00	51.29	0.00	3039
B88-06-R16-FC1	Cond Ext Pump	400.1	138.50	2.58	2081	0.38	56.38	9.01	4518
B88-06-R17-FC1	Cond Ext Pump	539.5	151.56	2.58	2094	0.38	57.47	10.22	5825
B88-06-R18-FC1	Cond Ext Pump	616.6	161.06	2.71	2488	0.38	59.16	12.44	6529
B88-06-R19-FC1	Cond Ext Pump	785.6	175.43	3.65	2916	0.38	61.90	15.73	7282
B88-06-R20-FC1	Cond Ext Pump	866.9	182.12	4.08	3063	0.38	62.75	16.99	7535
B88-06-R21-FC1	Cond Ext Pump	903.9	204.00	5.17	3485	0.38	65.37	20.43	8160
B88-06-R4-FC2	HP Heater 5A	249.9	33.74	3.73	938	0.70	5.56	4.72	1965
B88-06-R5-FC2	HP Heater 5A	292.9	35.64	4.94	1401	1.09	8.37	6.32	2815
B88-06-R6-FC2	HP Heater 5A	314.5	36.65	5.32	1548	1.09	9.20	10.71	3089
B88-06-R7-FC2	HP Heater 5A	313.0	38.00	5.91	1836	1.25	10.22	13.79	3343
B88-06-R8-FC2	HP Heater 5A	645.7	43.17	21.97	6233	3.98	32.03	29.69	10582
B88-06-R9-FC2	HP Heater 5A	1116.8	55.22	32.00	8856	6.19	43.77	39.90	14545
B88-06-R10-FC2	HP Heater 5A	1114.6	68.50	33.82	9413	21.50	46.13	42.44	15381
B88-06-R11-FC2	HP Heater 5A	1113.5	82.33	35.13	9951	36.60	48.83	43.06	16150
B88-06-R12-FC2	HP Heater 5A	704.3	92.89	95.31	14108	42.77	80.60	66.89	23315
B88-06-R13-FC2	HP Heater 5A	10.6	103.93						
B88-06-R14-FC2	HP Heater 5A	2.2	111.00	0.01	5	0.00	0.09	0.01	15
B88-06-R15-FC2	HP Heater 5A	105.6	127.50	1.88	977	0.00	36.11	1.35	3083

TABLE: B-8 Cumulative Transport of Corrosion Products at Bruce-7 During June 1988 Startup (cont'd)

Sample Number	Sample Location	Avg Flow Rate (kg/s)	Ref. Time (hour)	Cumulative Transport (g) Ni	Fe	Ti	Mn	Cr	Particle
B88-06-R16-FC2	HP Heater 5A	456.4	138.50	3.82	1418	0.00	41.40	5.07	4021
B88-06-R17-FC2	HP Heater 5A	639.5	151.56	7.04	2128	0.41	48.58	9.81	5190
B88-06-R18-FC2	HP Heater 5A	752.9	161.06	9.09	2580	0.41	52.00	11.51	5871
B88-06-R19-FC2	HP Heater 5A	968.3	175.43	13.43	3427	0.98	59.37	15.71	7289
B88-06-R20-FC2	HP Heater 5A	1040.2	182.12	14.24	3657	0.98	60.42	16.81	7749
B88-06-R21-FC2	HP Heater 5A	1087.4	204.00	15.81	4124	0.98	63.00	19.25	8563
B88-06-R4-FC8	Moist Sepr Drn		33.74						
B88-06-R5-FC8	Moist Sepr Drn		35.64						
B88-06-R6-FC8	Moist Sepr Drn		36.65						
B88-06-R7-FC8	Moist Sepr Drn		38.00						
B88-06-R8-FC8	Moist Sepr Drn		43.17						
B88-06-R9-FC8	Moist Sepr Drn		55.22						
B88-06-R10-FC8	Moist Sepr Drn		68.50						
B88-06-R11-FC8	Moist Sepr Drn		82.33						
B88-06-R12-FC8	Moist Sepr Drn		92.89						
B88-06-R13-FC8	Moist Sepr Drn		103.93						
B88-06-R14-FC8	Moist Sepr Drn		111.00						
B88-06-R15-FC8	Moist Sepr Drn		127.50						
B88-06-R16-FC8	Moist Sepr Drn		138.50						
B88-06-R17-FC8	Moist Sepr Drn		151.56						
B88-06-R18-FC8	Moist Sepr Drn		161.06						
B88-06-R19-FC8	Moist Sepr Drn		175.43						
B88-06-R20-FC8	Moist Sepr Drn		182.12						
B88-06-R21-FC8	Moist Sepr Drn		204.00						
B88-06-R4-FC6	PreHtr to SG 1-4	249.9	33.74	0.60	134	0.13	0.67	0.55	235
B88-06-R5-FC6	PreHtr to SG 1-4	292.9	35.64	2.69	472	0.46	2.08	1.95	754
B88-06-R6-FC6	PreHtr to SG 1-4	314.5	36.65	3.88	664	0.65	2.87	2.75	1048
B88-06-R7-FC6	PreHtr to SG 1-4	313.0	38.00	5.47	922	0.91	4.00	3.82	1443
B88-06-R8-FC6	PreHtr to SG 1-4	645.7	43.17	15.14	2948	2.52	12.03	11.76	4573
B88-06-R9-FC6	PreHtr to SG 1-4	1116.8	55.22	22.17	4940	4.35	21.65	20.32	8028
B88-06-R10-FC6	PreHtr to SG 1-4	1114.6	68.50	24.09	5220	4.35	27.42	21.43	8411
B88-06-R11-FC6	PreHtr to SG 1-4	1113.5	82.33	24.83	5335	4.35	32.86	21.43	8653
B88-06-R12-FC6	PreHtr to SG 1-4	704.3	92.89	55.71	9852	10.13	57.96	45.50	16104
B88-06-R13-FC6	PreHtr to SG 1-4	10.6	103.93						
B88-06-R14-FC6	PreHtr to SG 1-4	2.2	111.00	0.00	0	0.00	0.01	0.04	2
B88-06-R15-FC6	PreHtr to SG 1-4	105.6	127.50	0.24	29	0.00	1.44	3.64	93
B88-06-R16-FC6	PreHtr to SG 1-4	456.4	138.50	1.04	151	3.79	3.09	5.59	379
B88-06-R17-FC6	PreHtr to SG 1-4	639.5	151.56	1.85	385	10.11	5.73	7.40	679
B88-06-R18-FC6	PreHtr to SG 1-4	752.9	161.06	3.77	636	10.41	6.80	9.32	1150
B88-06-R19-FC6	PreHtr to SG 1-4	968.3	175.43	6.05	892	10.41	7.89	11.01	1872
B88-06-R20-FC6	PreHtr to SG 1-4	1040.2	182.12	7.01	1018	10.41	8.37	11.88	2016
B88-06-R21-FC6	PreHtr to SG 1-4	1087.4	204.00	11.98	1697	10.41	11.16	16.53	3195
B88-06-F4-FC7	Reheater Drain	0.0	33.74	0.00	0	0.00	0.00	0.00	0
B88-06-R5-FC7	Reheater Drain	0.0	35.64	0.00	0	0.00	0.00	0.00	0
B88-06-R6-FC7	Reheater Drain	0.0	36.65	0.00	0	0.00	0.00	0.00	0
B88-06-R7-FC7	Reheater Drain	0.0	38.00	0.00	0	0.00	0.00	0.00	0
B88-06-R8-FC7	Reheater Drain	0.1	43.17	0.01	8	0.00	0.02	0.01	14
B88-06-R9-FC7	Reheater Drain	37.5	55.22	1.54	748	0.61	2.42	1.50	1146
B88-06-R10-FC7	Reheater Drain	41.5	68.50	1.55	755	0.86	2.48	1.56	1163

TABLE: B-8 Cumulative Transport of Corrosion Products at Bruce-7 During June 1988 Startup (cont'd)

Sample Number	Sample Location	Avg Flow Rate (kg/s)	Ref. Time (hour)	Cumulative Transport (g) Ni	Fe	Ti	Mn	Cr	Particle
B88-06-R11-FC7	Reheater Drain	41.2	82.33	1.58	770	1.13	2.56	1.58	1184
B88-06-R12-FC7	Reheater Drain	15.3	92.89	2.71	809	1.31	4.05	2.32	1784
B88-06-R13-FC7	Reheater Drain	1.3	103.93						
B88-06-R14-FC7	Reheater Drain	1.4	111.00	0.00	0	0.00	0.00	0.00	0
B88-06-R15-FC7	Reheater Drain	1.3	127.50	0.00	1	0.00	0.00	0.00	1
B88-06-R16-FC7	Reheater Drain	1.3	138.50	0.02	15	0.00	0.06	0.03	24
B88-06-R17-FC7	Reheater Drain	1.3	151.56	0.04	25	0.01	0.11	0.05	46
B88-06-R18-FC7	Reheater Drain	20.3	161.06	0.15	60	0.13	0.30	0.15	141
B88-06-R19-FC7	Reheater Drain	39.6	175.43	0.19	77	0.31	0.48	0.18	181
B88-06-R20-FC7	Reheater Drain	39.6	182.12	0.21	86	0.31	0.51	0.20	195
B88-06-R21-FC7	Reheater Drain	39.6	204.00	0.23	93	0.31	0.53	0.22	207
B88-06-R4-FC4	SG Blow Off	1.5	33.74	0.03	3	0.03	0.03	0.01	5
B88-06-R5-FC4	SG Blow Off	1.5	35.64	0.06	5	0.05	0.05	0.03	9
B88-06-R6-FC4	SG Blow Off	1.5	36.65	0.07	7	0.07	0.06	0.04	11
B88-06-R7-FC4	SG Blow Off	1.5	38.00	0.09	8	0.09	0.08	0.05	14
B88-06-R8-FC4	SG Blow Off	1.5	43.17	0.18	17	0.17	0.16	0.11	27
B88-06-R9-FC4	SG Blow Off	1.5	55.22	0.35	23	0.24	0.24	0.28	76
B88-06-R10-FC4	SG Blow Off	1.5	68.50	0.54	44	0.39	0.42	0.34	112
B88-06-R11-FC4	SG Blow Off	1.5	82.33	0.83	64	0.54	0.60	0.45	145
B88-06-R12-FC4	SG Blow Off	1.5	92.89	0.85	66	0.56	0.65	0.51	344
B88-06-R13-FC4	SG Blow Off	1.7	103.93						
B88-06-R14-FC4	SG Blow Off	1.8	111.00	0.00	1	0.00	0.14	0.01	1
B88-06-R15-FC4	SG Blow Off	1.8	127.50	0.35	35	0.23	0.74	0.19	55
B88-06-R16-FC4	SG Blow Off	1.7	138.50	0.38	37	0.25	0.87	0.20	59
B88-06-R17-FC4	SG Blow Off	1.7	151.56	0.44	41	0.28	1.04	0.23	64
B88-06-R18-FC4	SG Blow Off	1.8	161.06	0.47	43	0.31	1.24	0.24	67
B88-06-R19-FC4	SG Blow Off	1.8	175.43	0.71	66	0.54	1.74	0.35	2426
B88-06-R20-FC4	SG Blow Off	1.8	182.12	0.77	71	0.57	1.78	0.38	2434
B88-06-R21-FC4	SG Blow Off	1.8	204.00	0.81	73	0.59	1.80	0.39	2438
B88-06-R4-FC5	SG Feedwater	249.9	33.74	0.60	134	0.13	0.67	0.55	
B88-06-R5-FC5	SG Feedwater	292.9	35.64	2.69	472	0.46	2.08	1.95	
B88-06-R6-FC5	SG Feedwater	314.5	36.65	3.88	664	0.65	2.87	2.75	
B88-06-R7-FC5	SG Feedwater	313.0	38.00	5.47	922	0.91	4.00	3.82	
B88-06-R8-FC5	SG Feedwater	645.8	43.17	15.14	2949	2.52	12.04	11.76	
B88-06-R9-FC5	SG Feedwater	1154.3	55.22	22.41	5007	4.42	21.97	20.61	
B88-06-R10-FC5	SG Feedwater	1156.1	68.50	24.40	5298	4.42	27.95	21.76	
B88-06-R11-FC5	SG Feedwater	1154.7	82.33	25.17	5417	4.42	33.60	21.76	
B88-06-R12-FC5	SG Feedwater	719.6	92.89	56.72	10032	10.31	59.24	46.35	
B88-06-R13-FC5	SG Feedwater	11.9	103.93						
B88-06-R14-FC5	SG Feedwater	3.6	111.00	0.00	0	0.00	0.02	0.06	
B88-06-R15-FC5	SG Feedwater	106.9	127.50	0.25	30	0.00	1.46	3.71	
B88-06-R16-FC5	SG Feedwater	457.6	138.50	1.04	152	3.80	3.12	5.66	
B88-06-R17-FC5	SG Feedwater	640.8	151.56	1.85	387	10.13	5.77	7.48	
B88-06-R18-FC5	SG Feedwater	773.2	161.06	3.83	644	10.44	6.87	9.45	
B88-06-R19-FC5	SG Feedwater	1007.9	175.43	6.21	910	10.44	8.00	11.21	
B88-06-R20-FC5	SG Feedwater	1079.7	182.12	7.20	1041	10.44	8.49	12.11	
B88-06-R21-FC5	SG Feedwater	1127.0	204.00	12.35	1745	10.44	11.39	16.93	

TABLE: B-9 . Water Chemistry Data of Bruce-7 June 13 - 24, 1988

DATE	TIME	SAMPLING POINT	PH	COND ms/m	Na ug/kg	D.O. ug/kg	HYDRAZINE ug/kg	MAKEUP kg/s	BLOWDOWN kg/s	COMMENTS
09-Jun-88	00:00	CEP	10.40	7.40			88600			
		DA	10.30	5.10			61400			
10-Jun-88	00:00	CEP	9.80	1.70			4000			
		DA	9.90	2.40			5000			
12-Jun-88	03:00	CEP	9.70	1.20			1740			
		DA	10.00	1.60			1830			
13-Jun-88	00:00	CEP	9.30	0.70			560			
		DA	9.70	1.40			1620			
14-Jun-88	00:00	CEP	9.90	1.90			3850			
		DA	10.10	2.70			7700			
16-Jun-88	00:00	CEP	9.40	0.70			15			
		Bo5	9.10	1.10	48					
		Bo6	9.00	1.00	54					
		Bo7	9.30	1.20	41					
		Bo8	9.50	1.40	35					
	21:00	Bo1-4	8.90	1.42	190					
		Bo5-8	9.30	1.02	130					
17-Jun-88	06:00	CEP	9.30	0.73			6			
		5A	9.20	0.74			5			
	21:00	CEP	9.90	2.10	<2		60	15.30		
		5A	9.80	2.00	<2	<5	146			
		MS	10.00	2.20	<2					
		Bo1-4	9.30	1.69	110				>2.5	BO 1-8 blowoff 2h
		Bo5-8	9.40	O/S	105				>2.5	
18-Jun-88	20:00	CEP	10.00	2.30	<2	10	8			
		5A	10.00	2.20	<2	<5	22			
		MS	10.00	2.30	<2					
		Bo1	9.60	1.30	14					
		Bo2	9.60	1.40	15					
		Bo3	9.70	1.40	2					
	23:00	Bo4	9.60	1.20	2					
		Bo5	9.40	3.80	250					BO 5-8 blowoff 2h
		Bo6	9.50	4.70	210					
		Bo7	9.60	1.80	210					
		Bo8	9.50	1.70	220					
19-Jun-88	06:00	5A					420			
	14:00	Bo5			4					
		Bo6			3					
		Bo7			3					
		Bo8			3					
21-Jun-88	00:00	CEP	9.00	1.00	<2		<3			
		5A	9.50	1.90	<2		360			

TABLE: B-9 Water Chemistry Data of Bruce-7 June 13 - 24, 1988 (cont'd)

DATE	TIME	SAMPLING POINT	PH	COND ms/m	Na ug/kg	D.O. ug/kg	HYDRAZINE ug/kg	MAKEUP kg/s	BLOWDOWN kg/s	COMMENTS
22-Jun-88	00:00	CEP	9.70	1.20	<2	10	<3			
		5A	9.70	1.20	<2	<5	20			
		MS	9.70	1.20	<2					
		Bo1-4	9.40	0.70	<2					
		Bo5-8	9.40	0.70	3					
	04:00	5A					45			
23-Jun-88	00:00	CEP	9.80	1.40	<2	5	10			
		5A	9.70	1.40	<2	<5	75			
		MS	9.80	1.50	<2					
		Bo1	9.40	0.80	<2					
		Bo2	9.40	0.80	<2					
		Bo3	9.40	0.80	<2					
		Bo4	9.40	0.80	<2					
		Bo5	9.40	0.80	5					BO 5,6,7 blowoff requested
		Bo6	9.40	0.80	3					
		Bo7	9.40	0.80	4					
		Bo8	9.40	0.80	<2					
	20:00	CEP	9.80	1.80	<2	<5	18			
		5A	9.70	1.80	<2	<5	61			
		MS	9.80	1.90	<2					
		Bo1-4	9.60	1.00	<2					

TABLE: B-10 System Flow Data of Bruce-7 During June 1988 Startup

DATE	CLOCK TIME		Ref. Time	POWER LEVEL	CEP	HP HEATER OUTLET	REHEATER DRAIN	S.G. INLET	BLOWDOWN
	HOURS	MINUTES	(hr.)	%	kg/s	kg/s	kg/s	kg/s	kg/s
16-Jun-88	22	11	22.19		0	45	0.7	46	0.01
17-Jun-88	0	42	24.70		85	48	0.0	48	0.01
	3	12	27.21		60	8	0.0	8	0.01
	7	13	31.23		180	198	0.0	198	0.02
	7	43	31.73		168	182	0.0	182	0.02
	8	14	32.23		262	259	0.0	259	0.01
	8	44	32.74		234	269	0.0	269	0.02
	9	14	33.24		245	254	0.0	254	0.18
	9	44	33.74		241	254	0.0	254	0.01
	10	14	34.24		243	252	0.0	252	0.10
	10	38	34.64	25.9	303	328	0.0	328	0.20
	11	8	35.14	25.6	303	304	0.0	304	0.01
	11	38	35.64	25.6	303	319	0.0	319	0.18
	12	8	36.14	25.7	309	313	0.0	313	0.08
	12	38	36.65	26.1	303	313	0.0	313	0.06
	13	0	37.00	26.1	303	313	0.0	313	0.06
	14	0	38.00	26.1	303	313	0.0	313	0.06
	18	10	42.17	66.3	775	836	0.0	836	0.02
	18	40	42.67	75.0	905	980	0.4	980	0.01
	19	10	43.17	74.8	897	966	0.7	967	0.18
	21	10	45.18	78.3	820	1005	40.3	1045	0.20
	21	40	45.68	78.4	809	1000	40.1	1040	0.01
	22	10	46.18	78.2	806	995	39.4	1034	0.01
	22	41	46.68	89.1	940	1167	41.1	1208	0.01
	23	11	47.19	89.0	926	1160	41.0	1201	0.01
	23	41	47.69	89.3	921	1148	41.6	1190	0.01
18-Jun-88	0	11	48.19	88.9	930	1150	40.8	1191	0.01
	0	41	48.69	88.7	932	1152	40.9	1193	0.01
	1	11	49.19	89.0	934	1150	41.3	1191	0.01
	1	41	49.70	88.7	927	1167	40.9	1208	0.01
	2	11	50.20	88.8	930	1160	42.0	1202	0.01
	2	42	50.70	89.1	932	1143	41.6	1184	0.01
	3	12	51.20	89.1	980	1209	41.2	1250	0.01
	3	42	51.70	89.5	967	1187	39.7	1227	0.01
	4	42	52.71	88.9	925	1150	40.4	1190	0.01
	5	12	53.21	88.7	956	1174	41.6	1216	0.01
	5	42	53.71	89.0	961	1167	40.2	1207	0.29
	6	12	54.21	89.3	956	1174	42.2	1216	0.33
	6	42	54.72	88.4	933	1165	40.7	1205	0.00
	7	13	55.22	89.0	934	1146	41.5	1187	0.01
	9	13	57.23	88.5	930	1165	40.2	1205	0.01
	9	43	57.73	88.6	937	1142	40.5	1183	0.01
	10	13	58.23	89.1	944	1159	40.8	1200	0.01
	10	43	58.73	88.0	933	1158	41.0	1199	0.01
	11	14	59.23	88.8	934	1152	41.4	1193	0.01
	12	14	60.24	85.8	889	1097	41.3	1139	0.01
	15	15	63.25	85.9	895	1111	44.2	1155	0.01
	15	45	63.75	85.9	873	1094	41.6	1136	0.01
	16	15	64.25	85.8	877	1086	41.1	1127	0.01
	20	30	68.50	85.8	877	1086	41.1	1127	0.01

TABLE: B-10 System Flow Data of Bruce-7 During June 1988 Startup (cont'd)

DATE	CLOCK TIME		Ref. Time	POWER LEVEL	CEP	HP HEATER OUTLET	REHEATER DRAIN	S.G. INLET	BLOWDOWN
	HOURS	MINUTES	(hr.)	%	kg/s	kg/s	kg/s	kg/s	kg/s
19-Jun-88	7	19	79.32	86.5	892	1114	41.2	1155	1.20
	7	49	79.82	90.7	932	1168	40.1	1208	1.18
	8	19	80.33	90.5	941	1164	41.9	1206	1.20
	9	49	81.80	90.7	950	1166	41.3	1207	1.19
	10	19	82.33	90.9	948	1176	41.5	1218	1.22
	11	20	83.34	95.7	997	1248	41.2	1289	1.22
	12	0	84.00	95.6	998	1228	40.8	1269	1.21
	12	50	84.84	95.4	1005	1243	42.0	1285	1.22
	13	20	85.35	95.2	994	1233	40.9	1274	1.27
	14	51	86.85	46.1	483	444	0.0	444	1.70
	15	51	87.86	59.5	607	712	0.8	713	1.64
	16	21	88.36	53.2	535	632	1.1	633	1.62
	16	51	88.87	49.0	543	673	1.0	674	1.66
	17	22	89.37	39.0	394	455	1.1	456	1.67
	17	52	89.87	39.2	263	366	1.2	367	1.61
	18	22	90.37	39.2	430	451	1.2	452	1.60
	18	52	90.88	38.5	412	491	1.1	493	1.71
	19	22	91.38	39.3	220	216	1.0	217	1.69
	20	23	92.38	0	31	0	0.9	1	1.32
	20	53	92.89	0	28	4	0.9	5	1.48
	21	23	93.39	0	19	0	1.2	1	1.75
	21	53	93.89	0	36	32	1.2	33	1.71
	22	23	94.39	0	14	7	1.1	8	1.67
	22	53	94.89	0	19	27	1.1	29	1.59
	23	23	95.40	0	24	24	1.2	25	1.61
	23	53	95.90	0	54	20	1.2	21	1.58
20-JUN-88	0	23	96.40	0	14	30	1.2	31	1.63
	0	54	96.90	0	0	4	1.2	5	1.55
	1	24	97.40	0	24	21	1.2	22	1.61
	1	54	97.91	0	34	0	1.3	1	1.63
	2	24	98.41	0	0	0	1.5	1	1.79
	2	54	98.91	0	0	5	1.4	7	1.86
	3	24	99.41	0	19	0	1.4	1	1.85
	3	54	99.91	0	14	0	1.5	1	1.87
	4	24	100.41	0	14	0	1.4	1	1.80
	4	55	100.92	0	0	20	1.4	21	1.79
	5	25	101.42	0	0	0	1.6	2	1.80
	5	55	101.92	0	0	16	1.4	17	1.77
	6	25	102.42	0	0	0	1.5	1	1.79
	6	55	102.92	0	24	9	1.4	10	1.78
	7	25	103.43	0	14	0	1.1	1	1.77
	7	55	103.93	0	0	31	1.4	33	1.79
	8	25	104.43	0	0	16	1.6	17	1.79
	8	55	104.93	0	14	0	1.3	1	1.80
	10	0	106.00	0	0	0	1.3	1	1.80
	15	0	111.00	0	0	0	1.3	1	1.80

TABLE: B-10 System Flow Data of Bruce-7 During June 1988 Startup (cont'd)

DATE	CLOCK TIME		Ref. Time	POWER LEVEL	CEP	HP HEATER OUTLET	REHEATER DRAIN	S.G. INLET	BLOWDOWN
	HOURS	MINUTES	(hr.)	%	kg/s	kg/s	kg/s	kg/s	kg/s
21-JUN-88	1	0	121.00	0	0	0	1.3	1	1.80
	1	15	121.25	22	261	273	1.3	275	1.71
	7	30	127.50	22	261	273	1.3	275	1.71
	11	0	131.00	22	261	273	1.3	275	1.71
	12	14	132.24	22	261	273	1.3	275	1.71
	18	30	138.50	51	540	640	1.3	641	1.72
22-JUN-88	7	33	151.56	51	540	640	1.3	641	1.72
	8	3	152.06	50	543	639	1.3	640	1.71
	11	2	155.03	51	531	648	1.3	649	1.71
	11	32	155.54	59	614	744	1.3	746	1.89
	12	2	156.04	59	611	753	1.3	755	1.79
	12	32	156.54	65	653	817	39.3	856	1.78
	13	2	157.04	68	698	843	38.9	882	1.78
	13	32	157.54	67	686	843	40.2	883	1.78
	14	2	158.05	67	683	845	39.0	884	1.79
	14	32	158.55	67	681	842	38.7	880	1.79
	15	3	159.05	68	679	827	39.6	867	1.78
	15	33	159.55	67	684	848	40.0	888	1.79
	16	3	160.06	67	673	843	38.7	882	1.79
	16	33	160.56	67	679	841	39.0	880	1.79
	17	3	161.06	68	685	851	39.0	890	1.78
	17	33	161.56	67	681	844	39.3	884	1.79
	18	3	162.06	67	699	834	39.2	874	1.78
	18	34	162.57	67	685	854	40.7	894	1.79
	22	54	166.91	71	727	890	39.0	929	1.80
	23	10	167.17	81	823	1029	40.1	1069	1.80
	23	21	167.36	82	848	1040	39.6	1079	1.80
23-JUN-88	7	25	175.43	81	844	1045	39.6	1085	1.80
	9	30	177.50	81	844	1045	39.6	1085	1.80
	14	6	182.12	87	911	1031	39.6	1071	1.80
24-JUN-88	7	16	199.28	87	899	1124	39.6	1163	1.80
	12	0	204.00	87	899	1124	39.6	1163	1.80

TABLE: B-11 Average System Flow During Sampling Runs During Startup
June 1988

Run #	Ref. Time (hr)	CEP Flow Rate (kg/s)	HP Heater Flowrate (kg/s)	Reheater Drain (kg/s)	S.G. INLET (kg/s)	BLOWDOWN (kg/s)
Run #4	33.74	236.1	249.9	0.0	249.9	0.1
Run #5	35.64	280.5	292.9	0.0	292.9	0.1
Run #6	36.65	305.8	314.5	0.0	314.5	0.1
Run #7	38.00	303.0	313.0	0.0	313.0	0.1
Run #8	43.17	603.1	645.7	0.1	645.8	0.0
Run #9	55.22	913.4	1116.8	37.5	1154.3	0.1
Run #10	68.50	900.5	1114.6	41.5	1156.1	0.0
Run #11	82.33	896.2	1113.5	41.2	1154.7	0.7
Run #12	92.89	596.2	704.3	15.3	719.6	1.5
Run #13	103.93	15.2	10.6	1.3	11.9	1.7
Run #14	111.00	1.5	2.2	1.4	3.6	1.8
Run #15	127.50	130.3	136.6	1.3	137.9	1.8
Run #16	138.50	400.1	456.4	1.3	457.6	1.7
Run #17	151.56	539.5	639.5	1.3	640.8	1.7
Run #18	161.06	616.6	752.9	20.3	773.2	1.8
Run #19	175.43	785.6	968.3	39.6	1007.9	1.8
Run #20	182.12	866.9	1040.2	39.6	1079.7	1.8
Run #21	204.00	903.9	1087.4	39.6	1127.0	1.8

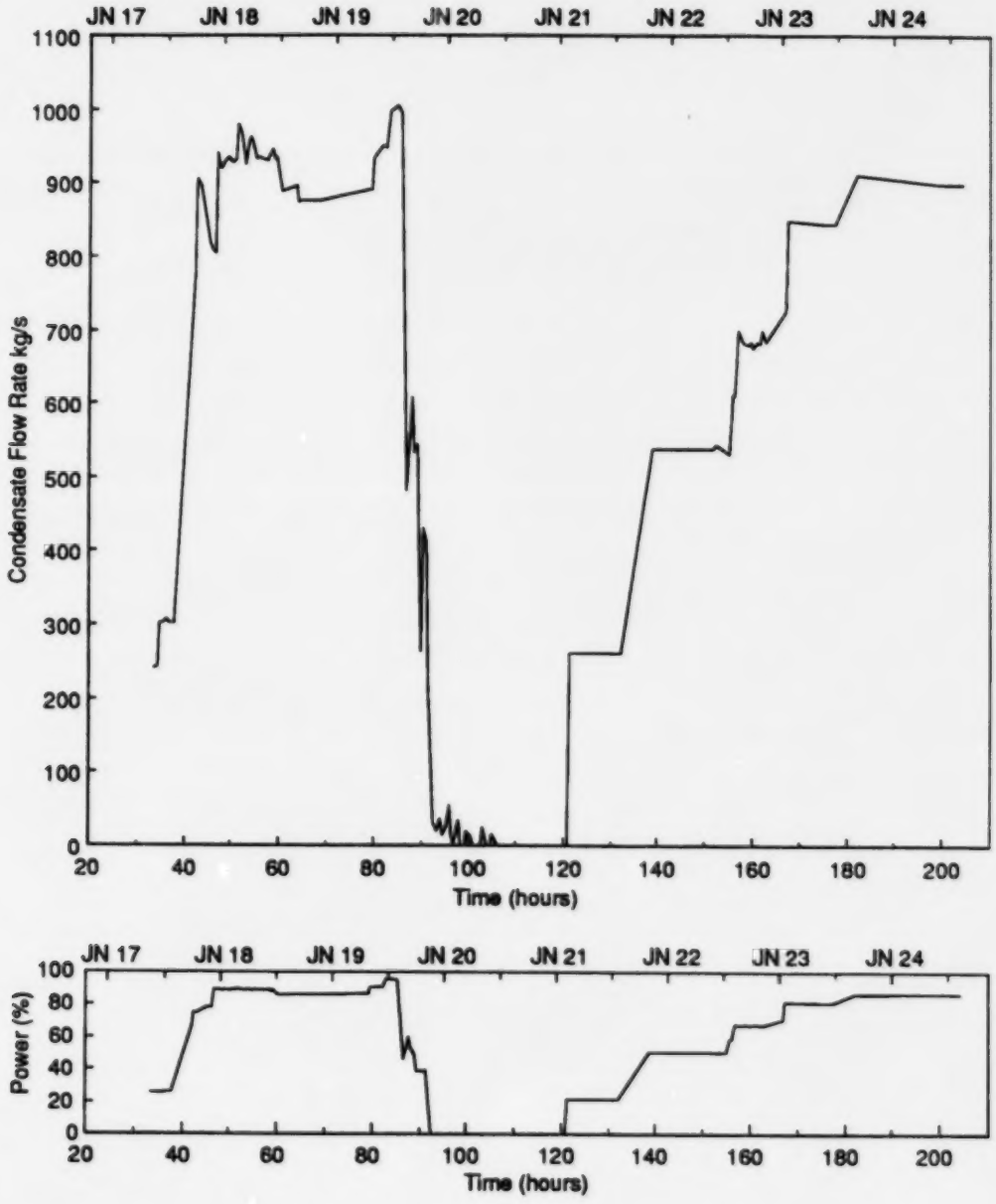


FIGURE B-1

SYSTEM FLOW CONDITIONS AT
CONDENSATE EXTRACTION PUMP DISCHARGE
OF BRUCE B-7 DURING JUNE 1988 STARTUP

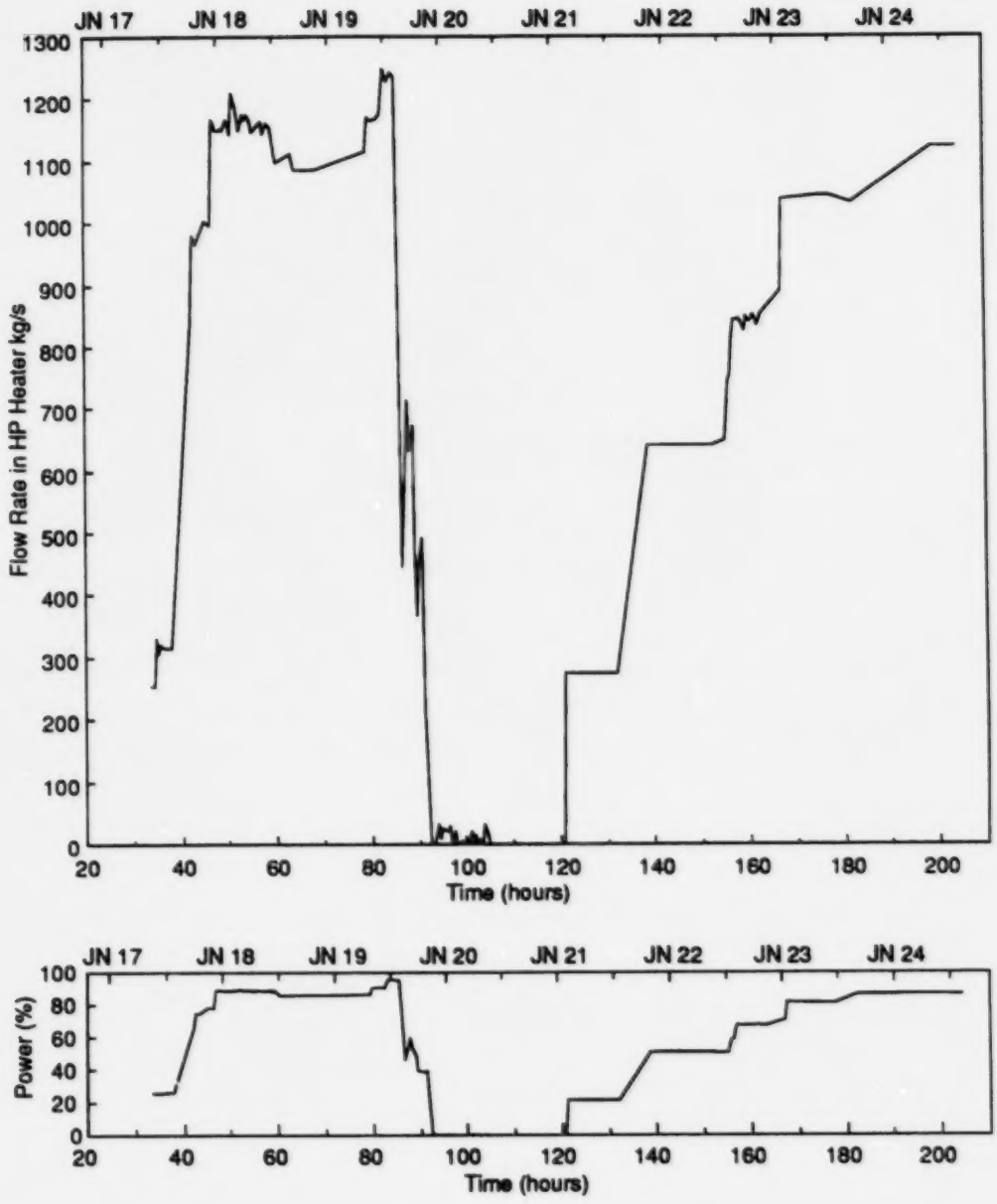


FIGURE B-2

SYSTEM FLOW CONDITIONS AT HP HEATER OUTLET
OF BRUCE B-7 DURING JUNE 1988 STARTUP

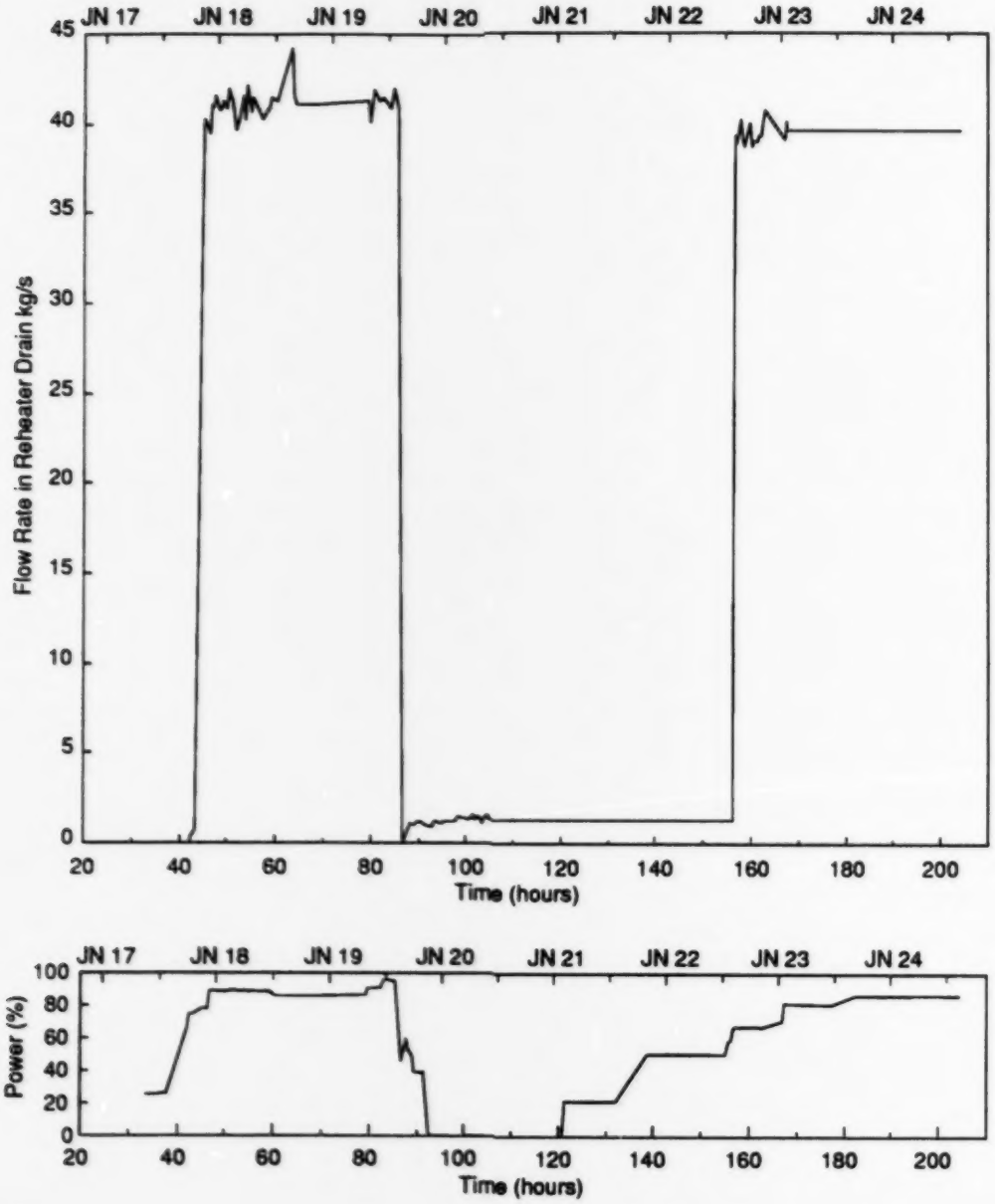


FIGURE B-3

SYSTEM FLOW CONDITIONS AT REHEATER DRAIN OF BRUCE B-7 DURING JUNE 1988 STARTUP

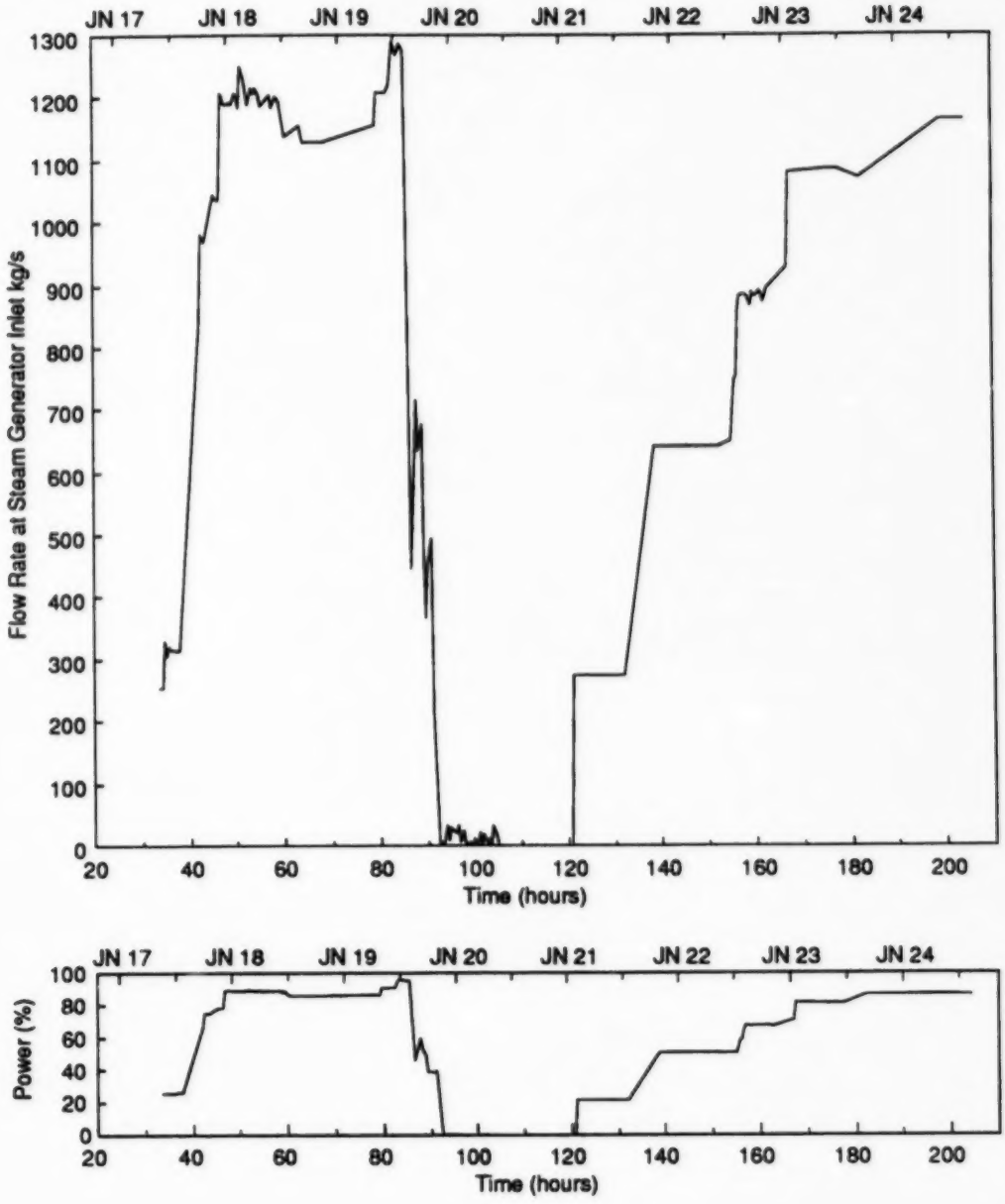


FIGURE B-4

SYSTEM FLOW CONDITIONS AT STEAM GENERATOR INLET
OF BRUCE B-7 DURING JUNE 1988 STARTUP